

Atypical coronary veins anatomy as an obstacle for cardiac resynchronization therapy – case report

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Abstract

Background: Cardiac resynchronization therapy (CRT) is a standard for end-stage heart failure patients. During CRT procedure, left ventricular lead is positioned through coronary sinus (CS) in a coronary vein.

Case report: 51-year-old man with dilated cardiomyopathy and persistently symptomatic heart failure despite medical therapy was referred for implantation of CRT system. During CRT procedure, CS ostium was localized and venography was performed.

Anatomical variant of CS with lack of typical wide venous trunks was revealed. Instead narrow coronary veins and large venous sinus appeared. Despite 60-minute lasting fluoroscopy it was not possible to guide the lead across venous structures.

Conclusion: Atypical CS anatomy presenting as venous sinuses could be a serious obstacle for CRT.

Key words: cardiac resynchronization, biventricular pacing, lead placement, coronary sinus anatomy.

Introduction

A common finding in advanced congestive heart failure (CHF) is an abnormal, delayed electrical activation of the ventricles or electrical ventricular dyssynchrony. Such dyssynchrony, apparent on the electrocardiogram as a QRS interval lasting more than 120 ms, could be seen in almost 50% CHF patients [1]. In recent years cardiac pacemakers have been modified to correct ventricular dyssynchrony, a treatment referred to as cardiac resynchronization (CRT) [2, 3]. In addition to traditional right ventricular pacing, CRT uses an additional left ventricular lead which enables biventricular pacing.

The left ventricular lead is positioned through the coronary sinus (CS) in a coronary vein. Posterolateral and lateral coronary veins are believed to be the optimal vessels for CRT. In a typical procedure, CS ostium could be found after a few minutes of fluoroscopy. Then the left ventricle lead is introduced through the ostium into the CS and veins.

Case report

The patient was a 51-year-old man with 2-year history of dilated cardiomyopathy and persistently symptomatic heart failure despite medical therapy. His ECG demonstrated left bundle branch block (LBBB) pattern with the QRS duration of 140 ms. The base cardiac rhythm was sinus. The patient was referred for implantation of CRT system.

CS electrophysiology fixed curve catheter (CS, J-type, Medtronic U.S.) was placed in the venous system through left subclavian puncture. The catheter was introduced to the right atrium and CS ostium was easily detected. Then SCOUT implantation accessories (SCOUT, Biotronik Germany) was used for coronary venography. After the injection of contrast dye, only thin coronary veins and large venous sinuses were observed (Figure 1). Moving the venography catheter back, just above CS ostium, in order to open any unintentionally occluded coronary vein, did not change the coronary venogram. Then 60-minutes lasting unsuccessful attempts of guiding the left ventricle lead leader (Corox OTW, Biotronik Germany) across venous sinuses was made. Finally, because of lack of possibility of the left ventricle lead placement in the coronary vein system, we decided to abandon the procedure.

Discussion

Cardiac resynchronization therapy is increasingly used to treat patients with poor left ventricular function and asynchronous left ventricular contraction [3]. Generally, a transvenous approach is used for implantation of pacing leads. A critical step in biventricular pacemaker implantation is CS cannulation. CS lead implantation may be associated with various problems that may result in abandoning of the procedure [4, 5].

In our patient a very uncommon anatomical form of the coronary vein system was detected. There were no typical wide venous trunks, instead very thin veins and large curved sinuses were uncovered. In those conditions left ventricular lead implantation appeared to be impossible. Recently Ji et al. [6] proposed a modified transseptal LV endocardial lead placement via the left axillary vein for cardiac resynchronization. That technique could be a solution for individuals with abnormal CS anatomy.

Conclusion

Atypical CS anatomy presenting as venous sinuses could be a serious obstacle for CRT and may result in abandoning of the procedure.

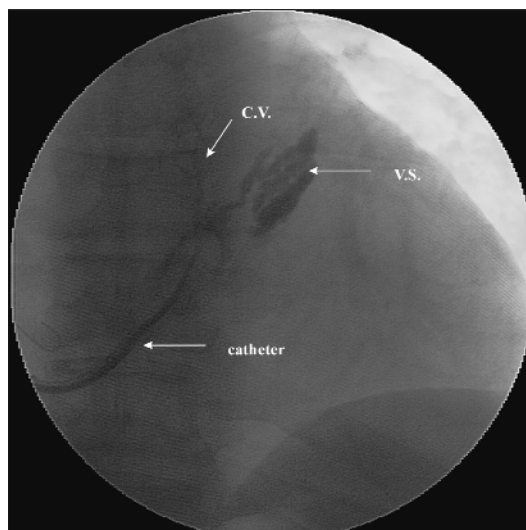


Figure 1. Coronary venography: coronary veins (CV), venous sinuses (VS) and venography catheter (catheter) in CS ostium

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