

Difficult Coronary Sinus Cannulation during Cardiac Resynchronization Therapy due to its Diverticulum

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Abstract:

Coronary sinus (CS) diverticulum is one the different types of malformations of the right atrium and CS. It can be the primary focus of supraventricular arrhythmias and complicate CS lead implantation during cardiac resynchronization therapy (CRT) device implantation. Herein, we report on a case of CS diverticulum that caused difficulty in CS lead insertion during CRT implantation.

Keywords: Cardiac Resynchronization Therapy; Coronary Sinus Diverticulum; Heart Failure

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Introduction

Although rare, it is difficult to estimate the exact incidence rate of congenital malformations of coronary sinus (CS) and the right atrium. The most commonly reported malformation is CS diverticula, probably due to its association with WPW syndrome and supraventricular tachyarrhythmias.¹ Incidental finding of CS diverticulum is only reported in one case during cardiac resynchronization therapy (CRT) device implantation.² Herein, we report on another case that caused difficulty during this procedure.

Case Report

A 65-year-old man underwent CRT-D implantation due to dilated cardiomyopathy, one episode of sustained ventricular tachycardia, left ventricular ejection fraction of 20%, LBBB and NYHA class III.

After giving informed consent and overnight fast, under conscious sedation in the sterile condition, we punctured the left subclavian vein. After passing three guide wires by Seldinger method, the

prepectoral pocket was created. Using a 9-French peel away sheath, a sense/pace/high voltage 65-cm active lead was implanted on the interventricular septum and a bipolar 52-cm active lead was implanted in the right atrial appendage.

We then tried CS cannulation using an Attain

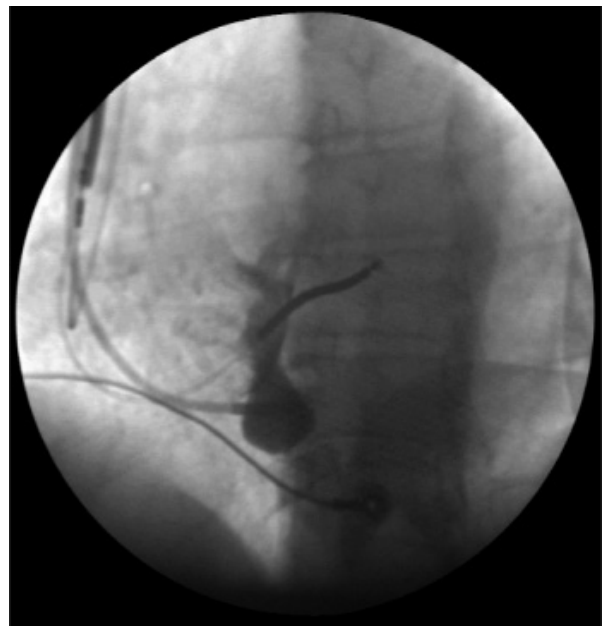


Figure 1a: LAO projection. A blinded end space found after contrast injection in the CS ostium.

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Figure 1b: LAO projection. Same finding after CS cannulation using a decapolar EP catheter

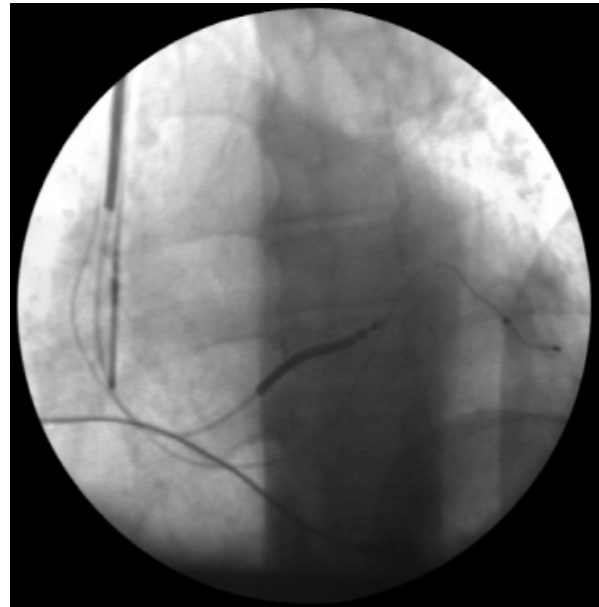


Figure 1c: LAO projection. Position of the CS lead in the lateral cardiac vein

Medtronic Inc. long intravascular sheath. After contrast injection, a large diverticulum adjacent to the CS ostium was observed (Fig. 1a). Due to difficulty in CS cannulation, we used a decapolar steerable CS catheter to find the CS ostium and cannulate it (Fig. 1b). Then, a bipolar lead was implanted in the lateral cardiac vein successfully (Fig. 1c).

Discussion

CS diverticula are rare anatomical variations but myocardial fibers found within the wall of diverticulum can connect the ventricular muscles and act as electrical substrate for atrioventricular re-entrant tachycardia. So most of the reports of symptomatic CS diverticula are about their associated arrhythmias—WPW and concealed accessory pathways.¹ Binder, *et al*, reviewed RA/CS anomalies in 105 reported cases between 1955 and 1998 and found that in symptomatic patients, CS diverticula were the most frequent findings (22%) and that symptoms were generally caused by arrhythmias.³

The most common cause of difficult left ventricular lead implantation is failure to access coronary venous system (up to 4%). Markedly enlarged right atrium with severe TR, tortuous, angulated, vertically positioned CS ostium, prominent Thebesian valve, prominent Vieussens valve and small-sized CS have been considered as important causes

of failure to CS access. Thal, *et al*, reported a patient who had a blind-end tubular pouch (diverticulum) that drained into the right atrium. As in our case, using a steerable catheter they could find the CS ostium, cannulate it and implant a CS lead. Therefore, this anatomical variation cannot prevent advancement in the left ventricle lead placement.

Accordingly, CS diverticula should be considered during CS manipulation for CRT device implantation. Although they may have some potential complication risks during the procedure, careful finding of the CS ostium electrical activity by steerable catheters can increase the success rate in this procedure.

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