Case Report
Successful ablation of a left-sided pathway in patient with a left atrial coronary sinus orifice: a case report

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Abstract: Coronary sinus (CS) is a landmark for cardiac intervention. Before catheter ablation of paroxysmal supraventricular tachycardia, coronary sinus is used to obtain recordings from the left atrium and ventricle. Despite asymptomatic, anomalies of coronary sinus may become an obstacle for electrophysiological catheterization. Here, we described a case of successful ablation of paroxysmal supraventricular tachycardia in which the accessory pathway located at the mitral valve annulus and the coronary sinus opened directly at left atrium. To the best of our knowledge, this is the first case reported that has left atrium catheterized, recorded and ablated through interatrial septum because of the left atrial coronary sinus orifice.

Keywords: Coronary sinus, supraventricular tachycardia, catheter ablation

Case report
A 48-year old woman was admitted due to an acute onset of palpitation 7 days ago with the diagnosis of paroxysmal supraventricular tachycardia (PSVT).

Routine laboratory tests showed no obvious abnormalities. Echocardiography ruled out atrial septal defect or other hidden congenital heart diseases. Catheter ablation was arranged two days after admission. During the procedure of electrophysiology study, both femoral veins were used. Two 4-pole catheters were placed at right ventricle and His bundle respectively. One 10-pole catheter was selected for the coronary sinus through left femoral vein. However, CS could not be attained with several attempts. Left subclavian vein was then used, but still failed. So the 10-pole CS catheter was placed at high right atrium (Figure 1). Stimulation of right atrium was then initiated excluding rightsided accessory pathway. When adjusting position of His bundle catheter, it sprang into left atrium through inter atrial septum. With RVA S1S1 stimulation, left sided accessory pathway was detected. CARTO system was applied for reconstruction of mitral valve annulus. On mitral valve annulus at 1 o'clock the accessory pathway was ablated and tachycardia terminated (Figure 2).

Multi-detector row computed tomography (MDCT) plus 3D reconstruction of coronary veins were arranged and the utterly isolation between CS and right atrium emerged (Figure 3A, 3D). The coronary veins drained into the CS with a left atrial ostium (Figure 3C). Persistent left superior vena cava (PLSVC) was not found. Echocardiography reconfirmed a dilated CS opening at posterior wall of left atrium in the vicinity of posterior mitral valve annulus (Figure 3B), 13 mm in width and 8mm in diameter.

Discussion
The coronary sinus (CS) is a clinically important structure for it serves as a crucial channel for electronic mapping and for attaining accessory atrioventricular pathways around the mitral valve. CS is around 45 mm in length and 10-12 mm in diameter. Its oval-shaped ostium is approximately 7×9 mm in size. The major tributaries of CS consist of great cardiac vein (GCV), middle cardiac vein (MCV), small cardiac vein (SCV), posterior vein of the left ventricle (PLV) and the oblique vein of the left atrium [1]. Despite asymptomatic, anomalies of coronary sinus may become a challenge during catheter ablation procedures. Classification of coronary sinus anomalies was initially introduced by Mantini et al in 1960s [2] and MDCT was con-
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sidered to be the ideal method of perceiving CS anomalies [3]. In a Korean, CT showed an engorged CS isolated from right atrium was connected to left atrium through a small tortuous vascular channel [4]. The anomaly was dis-

covered accidentally during screening test for coronary artery disease, so it posed no challenge for catheterization. Another case from Japan described a patient with narrow QRS tachycardia planning for catheter ablation. Pre-operative cardiac CT uncovered an abnormally enlarged coronary sinus with atresia of the right atrial ostium. An anomalous vein arose from the coronary sinus running behind the left atrial appendage draining into left atrium [5]. The ablation procedure was canceled in avoiding possible fatal complications [6]. During electrophysiology study, a catheter has to be guided into the CS in order to obtain recordings of the LA and LV. When CS orifice cannot be attained normally, malformation of CS has to be suspected and transseptal catheterization is still an option when right-sided accessory pathway is excluded. Echocardiography can also detect CS anomalies [7], but its high dependence on skills of technicians renders it an inefficient exam. Additionally, CS anomalies is visible during coronary angiography, but its invasive property attenuates its necessity as a screening procedure.

In Summary, CS anomalies may cause difficulties during electrophysiological catheterization. MDCT provides a non-invasive method of iden-

Figure 1. Position of catheters. Left anterior oblique view showed that 4-pole His bundle catheter (red asterisk) sprang into left atrium through interatrial septum and 10-pole coronary sinus catheter (yellow asterisk) was at high right atrial position.

Figure 2. CARTO image of accessory pathway. Reconstructed mitral valve annulus with CARTO system. Accessory pathway was detected (cyan dot) and ablated (red dot) at 1 o’clock.
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Identifying abnormalities of CS before interventions, superior to echocardiography or angiography. Granted that the CS cannot be reached during catheterization without the knowledge of CS anomalies, catheterization of left atrium through transseptal strategy may be a salvage method.

Disclosure of conflict of interest
None.

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References


Figure 3. Demonstration of CS anatomy. A, CT axial view illustrated completely isolation between CS and RA; B, Echocardiography shows connection between CS and LA; C, 3D reconstructed of coronary venous system. Diaphragmatic view shows that CS dilates and drains into LA. There is no small cardiac vein; D, Right view of the 3D reconstruction shows a gap separating CS and RV (green asterisk). CS = coronary sinus; RA = right atrium; LA = left atrium; RV = right ventricle; LV = left ventricle; GCV = great cardiac vein; MCV = middle cardiac vein; PLV = posterior vein of the left ventricle.
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