Case Report

Partial Unroofed Coronary Sinus Associated With Upper Septal Ventricular Tachycardia and Atrioventricular Nodal Reentrant Tachycardia

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Abstract

A 58 year old gentleman with complaints of palpitations and documented tachycardia was found to have a dilated right atrium, right ventricle and coronary sinus, which were due to partial unroofed coronary sinus without a left superior vena cava. He had upper septal ventricular tachycardia and atrio-ventricular nodal reentrant tachycardia, which was successfully treated by radiofrequency ablation.

Key words: partial unroofed coronary sinus; dilated coronary sinus; tachycardia

Case Report

A 58 year old gentleman with history of palpitations and baseline bi-fascicular block (Right bundle branch block with left axis deviation) and documented regular tachycardia of the same QRS morphology as the sinus rhythm QRS, was planned for an electrophysiology (EP) study. Pre-procedure trans-thoracic echocardiogram showed dilated coronary sinus (CS) and mildly dilated right atrium (RA) and right ventricular (RV) and normal left ventricular function. There was no evidence of a routine shunt lesion. Color Doppler imaging showed turbulence in the CS, which could not be further, characterized (Figure 1a). Cardiac magnetic resonance imaging (MRI) showed presence of a dilated CS, RA and RV. No left superior vena cava (SVC) was seen and there was partial unroofed CS, with shunt from left atrium (LA) to CS (Figure 1c and 1d). All pulmonary veins were draining normally into the left atrium and further no other shunt lesion was seen. There was no evidence of myocardial disease. Cardiac catheterization showed presence of a 1.5:1 left to right shunt, with normal pulmonary arterial pressures. Angiography showed CS extending posterior to the LA till its mid portion and opening with a wide mouth into the right atrium (Figure 1b). Coronary Angiography showed normal coronaries and coronary venous drainage except for dilated CS.

Upper septal ventricular tachycardia (Figure 2a, 2b and 2c) and atrio-ventricular nodal reentrant tachycardia (Figure 3a and 3b) induced on EP study were successfully treated. No
further treatment was advised for the congenital anomaly. Patient remains asymptomatic on 6 month follow up.

**Figure 1.** Dilated coronary sinus due to partial unroofing into left atrium. Figure 1a. Modified PLAX view on trans-thoracic echocardiography showed dilated coronary sinus with turbulence within it (marked with white arrow). Figure 1b. Coronary sinus angiography in LAO view showed a large coronary sinus opening with a wide mouth into the RA. Figure 1c. Cardiac MRI showing presence of large coronary sinus with clear differentiation between LA and CS in one of the planes (marked with black arrow). Figure 1d. Cardiac MRI showing presence of partial unroofed coronary sinus (marked with black arrow).

**Discussion**

The large distal coronary sinus in this patient was due to partial unroofing with a left to right shunt of 1.5:1 from the LA which was well imaged on cardiac MRI. There was no evidence of other structural anomaly including a left SVC on imaging modalities. Isolated partial unroofing to the coronary sinus with a left to right shunt is a rare anomaly. [1-3] Unroofed coronary sinus or coronary sinus diverticulums have been associated with accessory pathway and related tachycardia. [4,5]

The presence of baseline bifascicular block and both ventricular tachycardia and AVNRT can
be explained due to the deformation of the atrio-ventricular junction, Koch's triangle and ventricular septum due to the large coronary sinus. Based on pacing protocols ventricular tachycardia did not fit into the classical fascicular or the bundle branch reentrant tachycardia and possibly it was a result of reentrant circuit due to chronic stretch and resultant fibrosis in the upper septum with advancing age. Similar QRS morphology during sinus rhythm and ventricular tachycardia suggested exit site in the His-Purkinje system and spread of the impulse to the myocardium via the same. AVNRT in association with large coronary sinus due to persistent left SVC have been described earlier [6-8], but not in association with partial unroofing.

Figure 2. Upper-septal ventricular tachycardia (VT). Figure 2a. Intra-cardiac recordings during sinus rhythm showing diastolic signals in map d channel (marked with black arrow). Figure 2b. Intra-cardiac recordings during tachycardia showing earliest signals in the map d channel (marked with black arrow) as compared to the His signal. Figure 2c. Catheter position in RAO view during the above intra-cardiac recordings, with map catheter (marked with black arrow) positioned near in the upper part of the septum. (HRA: - high right atrial, map d: - Ablation catheter distal, map p: - Ablation catheter proximal, CS: - Coronary sinus)
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Figure 3. Atrio-ventricular nodal reentrant tachycardia. (AVNRT) Figure 3a. Tachycardia with short VA. Features were suggesting typical AVNRT. Figure 3b. Catheter position in LAO view during ablation of slow pathway. (Ablation catheter marked with black arrow)

Since the patient had symptoms of tachycardia only, which was successfully treated and patient thereafter remained asymptomatic, we thought it appropriate to not advise surgical closure of the isolated partial unroofing, of which surgical experience is limited.[3] Large CS without a left SVC and with partial unroofed CS with a left to right shunt and associated with upper septal ventricular tachycardia and atrio-ventricular nodal reentrant tachycardia has not been described prior to the best of our knowledge.

References


