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Radiofrequency ablation of premature ventricular contractions originating from uncommon sites of right ventricle

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ABSTRACT

Premature Ventricular Contraction (PVC)/ventricular tachycardia (VT) with left bundle branch block (LBBB) morphology and inferior axis has been described classically to originate from the right ventricular outflow tract (RVOT). Some uncommon sites of idiopathic ventricular arrhythmia (VA) origins have been revealed including tricuspid annulus (TA) and right ventricular (RV) inflow free wall region. We present a series of two cases who have undergone electrophysiological study and successful radiofrequency ablation of frequent monomorphic PVCs with LBBB pattern originating from relatively uncommon sites of RV – TA and RV inflow free wall region.

1. Procedure

The patients underwent electrophysiological study after informed consent. 6F quadripolar catheters were introduced from the right femoral vein (RFV) and placed across the tricuspid valve to record the His bundle activation and in the RV apex for pacing. Mapping and RFV. Simultaneous recording of the surface electrocardiogram and intracardiac electrograms were done using BARD EP system. Electroanatomical mapping of the RV, using the ENSITE NAVEX mapping system, during PVC was performed as previously reported [1,2].

2. Case

The first case was a 24-year-old gentleman having no underlying structural heart disease with repetitive symptomatic monomorphic PVC and a PVC burden of 23% on Holter There was no history of syncope or family history of sudden cardiac death. The PVC had LBBB morphology, QRS axis of +0° and precordial transition at V4. Upright R-wave in leads I, II & aVL, QS pattern in leads III, rs pattern in aVF and notching of the relative QRS complex were noted during PVC (Fig. 1A). The local electrograms from the RVOT and RV body were not earlier to the surface QRS. Pace mapping from the RVOT and RV body also did not give a 12/12 match. Activation mapping in the anterolateral TA showed local electrogram preceding the surface QRS by 35 ms. Isochronal map during PVC showed earliest activation at the anterolateral TA (Fig. 1B and C). Delivery of radiofrequency (RF) energy was made at this point keeping temperature at 55° Celsius and power at 50 W. PVC terminated within few seconds of ablation. Consolidation burns were given at this point for another 60 s. A 24 hour holter recording was done 3 months after the ablation which revealed no VT and PVC burden was less than 1%.

The second patient was an 18-year-old gentleman with a PVC burden of 34% on holter. The PVC had LBBB morphology, QRS axis of (+) 50° and precordial transition at V4. Upright R-wave in leads I, II, III & aVF, rS pattern in aVL and notching of the relatively broad QRS complex were noted during PVC (Fig. 2A). Activation mapping in the RV inflow free wall region adjacent to anterolateral TA showed local electrogram preceding the surface QRS by 38 ms. Isochronal map during PVC showed earliest activation at the region of RV inflow free wall region (Fig. 2B). Patient underwent successful radiofrequency ablation with symptom and arrhythmia free at 6 months of follow up.

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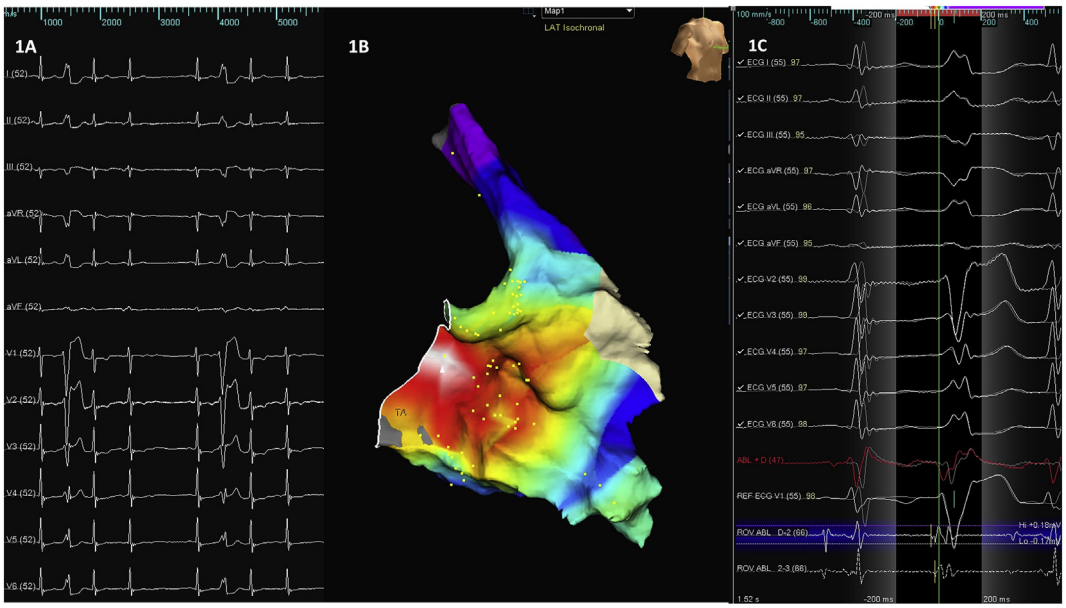

Fig. 1. Panel 1A - Surface electrocardiogram recording of spontaneous PVCs.(Patient 1).
Panel 1B – Isochronal map during PVC showing earliest local activation at the anterolateral tricuspid annulus.
Panel 1C – Surface electrocardiogram and intracardiac electrogram recorded at distal dipoles of mapping catheter kept at anterolateral tricuspid annulus.

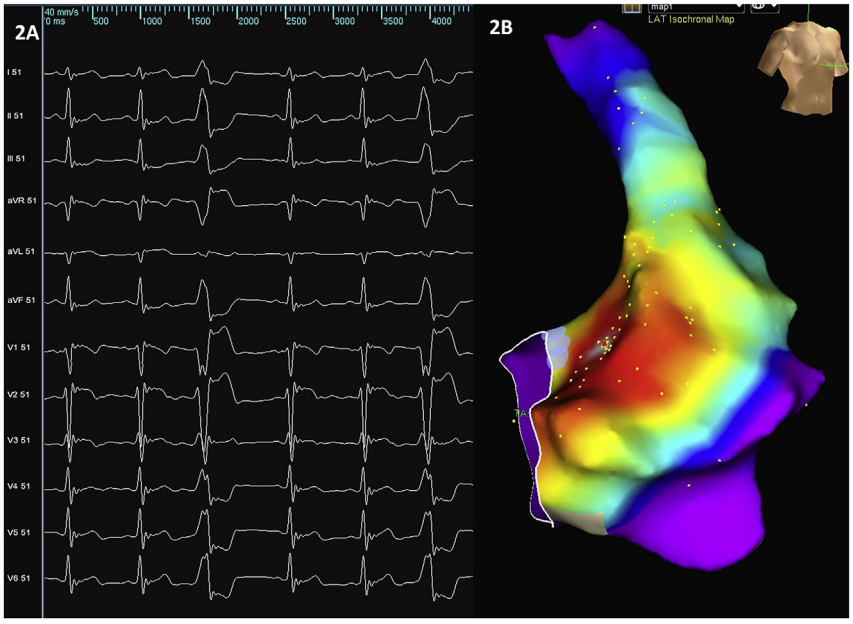

Fig. 2. Panel 2A- Surface electrocardiogram recording of spontaneous PVCs.(Patient 2).
Panel 2B – Isochronal map during PVC showing earliest local activation at the RV inflow free wall region.

3. Discussion

The majority of idiopathic ventricular arrhythmias, including VT and PVCs have a right ventricular outflow tract or left ventricular outflow tract. Uncommonly they can originate from LV epicardium and mitral annulus. Rarely paraHisian region and RV inflow free wall region and TA can also uncommonly give rise to PVC/VT.

Typically, outflow tract PVC originating in the RV manifests an inferior axis in the frontal plane and LBBB configuration with precordial R/S transition at or after lead V3. When a VT/PVC with a left bundle branch block morphology and R pattern in lead I is found in a patient with no structural heart disease, the focus of origin is located right ward from the midline. This includes structures such as posterior RVOT, right coronary cusp, paraHisian region and tricuspid annulus. Tricuspid annulus is an uncommon site for PVC origin in the RV. In a series by Tada et al. [3] of 454 patients with idiopathic VT/PVC, only 8% had VT/PVCs arising from the TA. Negative QRS complexes in the inferior leads may suggest inferior tricuspid annulus [4]. Distinguishing the origin of VT from the RVI region vs. the RVOT region can also be challenging. A late precordial transition with an RSR' or RR' in aVL, and a QS or rS pattern in aVR and V1 is characteristic of RV inflow PVC/VT [5].

Both these cases represent uncommon sites of origin of idiopathic ventricular arrhythmia which can be effectively targeted by electroanatomical mapping guided radiofrequency ablation.

Conflicts of interest

The authors declare that they have no conflict of interest.

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References

[1] Azegami K, Wilber DJ, Arruda M, Lin AC, Denman RA. Spatial resolution of pacemapping and activation mapping in patients with idiopathic right ventricular outflow tract tachycardia. J Cardiovasc Electrophysiol 2005;16:823–9.
[2] Joshi S, Wilber DJ. Ablation of idiopathic right ventricular outflow tract tachycardia: current perspectives. J Cardiovasc Electrophysiol 2005;16(Suppl 1):S52–8.
[3] Tada H, Tadokoro K, Ito S, Naito S, Hashimoto T, Kaseno K, Miyaji K, Sugiyasu A, Tsuchiya T, Kutsumi Y, Nogami A. Idiopathic ventricular arrhythmias originating from the tricuspid annulus: prevalence, electrocardiographic characteristics, and results of radiofrequency catheter ablation. Heart Rhythm 2007 Jan 31;4(1):7–16.
[4] Yue-Chun L, Wen-Wu Z, Na-Dan Z, Teng Z, Pin-Xiao W, Bei G, Jia L, Kang-Ting J, Jia-Feng L. Idiopathic premature ventricular contractions and ventricular tachycardias originating from the vicinity of tricuspid annulus: results of radiofrequency catheter ablation in thirty-five patients. BMC Cardiovasc Disord 2012 Jul 10;12(1):32.
[5] Ceresnak SR, Pass RH, Krumerman AK, Kim SG, Nappo L, Fisher JD. Characteristics of ventricular tachycardia arising from the inflow region of the right ventricle. J Electrocardiol 2012 Aug 31;45(4):385–90.