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Tricuspid annular PVCs: Radiofrequency ablation by subtricuspid retrograde catheter approach

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ABSTRACT

Tricuspid annular PVCs constitute 8% of idiopathic PVCs and 5% of RV PVCs. Although a rare entity to encounter in routine clinical practice, it can be a prime culprit behind major arrhythmic burden in few individuals. Electroanatomic approach with sub tricuspid retrograde catheter technique can target those annular PVCs and decrease the arrhythmia burden to normal or near normal range. Although procedural approach for parahisian PVCs requires a close look to avoid injury to native conduction system, TA PVCs are a real challenge due to inherent catheter instability and contact issue in sub tricuspid retrograde approach.

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1. Introduction

Idiopathic RV PVCs arise from RVOT, parahisian, peritricuspid, inflow, papillary muscle or moderator band. Although RVOT constitutes majority (70–80%) of RV VPCs, peritricuspid PVCs account for about 10% of idiopathic VPCs. Unique morphology with positive aVL and transition beyond V3 differentiates those from classical RVOT VPCs. Unlike mitral annulus, sub tricuspid annulus mapping poses little challenge with retrograde catheter approach where catheter stability and contact issue become major concern and often need a large curve ablation catheter for retrograde approach to the sub tricuspid region.

2. Case

Fifty-year-old diabetic, dyslipidemic and hypothyroid presented with recurrent paroxysmal palpitation since last three years. ECG

revealed HR 80 bpm with tricuspid annular PVCs of LBBB morphology with transition in V4, negative inferior leads with positive I and aVL (Fig. 1). Echocardiography revealed structurally normal heart with good biventricular function mild RVOT dilation with no aneurysm, dyskinesia, out pouching or noncompaction. 24-hour holter revealed PVC burden of 33% with bigeminy, trigeminy and short bursts of NSVT. He was planned for electrophysiology (EP) study and radiofrequency ablation.

3. Mapping and ablation

Baseline study revealed normal AH interval and slightly prolonged HV interval of 68 msec, may be secondary to longstanding antiarrhythmic drug effect. RV geometry was created in Ensite Precision mapping system, Voltage map revealed no scar in RV or RVOT. Activation mapping with large curve bidirectional irrigation ablation catheter revealed earliest endocardial activation in sub tricuspid posterolateral region where local VEGM preceded the surface QRS by 48 msec (Fig. 4). We approached this region by advancing the ablation catheter to mid RV and flexing it down with a retrograde curve towards the posterolateral tricuspid annulus. Ablation catheter here assumed a **classical elephant trunk** (Figs. 2

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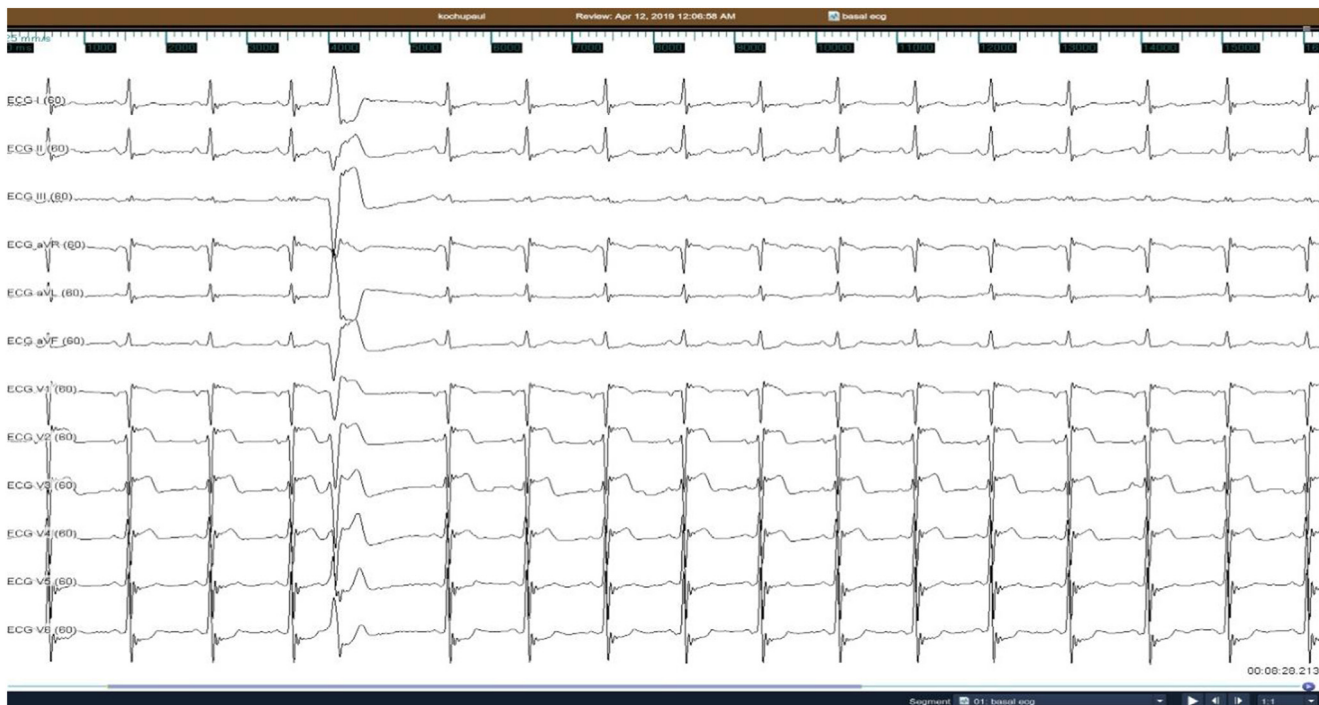


Fig. 1. Clinical PVCs.

and 3) shape to reach the site. Ablation lesions delivered here resulted in resolution of clinical VPCs. It was followed by few consolidation pulses around the site of successful ablation connecting to tricuspid annulus (Fig. 5). Post ablation, with Isoprenaline at 4 mcg/min and aggressive pacing protocol, no VPC/VT was induced. No recurrence of PVCs was noted even after 20 minutes of Isoprenaline wash out phase. RV angiogram revealed dilatation of RVOT (41 mm) with mild dilation of RV and normal RV systolic function. Next day morning patient was discharged without any PVC in recording telemetry or surface ECG with plan of cardiac MRI in follow up.

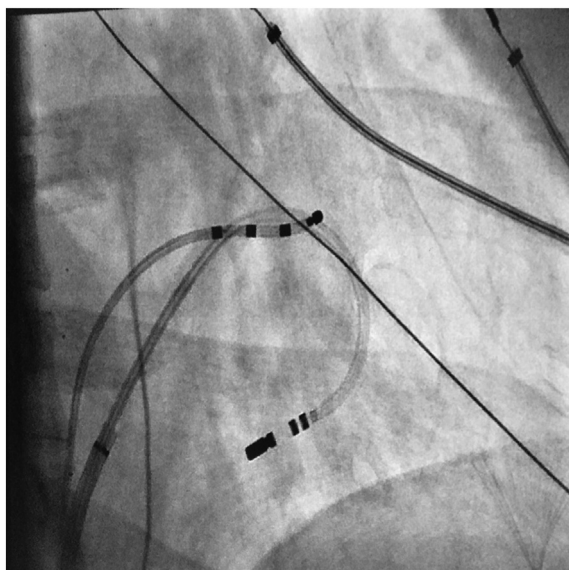


Fig. 2. Sub tricuspid Retrograde Approach.



Fig. 3. Subtricuspid retrograde approach.

4. Discussion

Tricuspid Annular PVCs exhibit a distinct morphology with dominant R wave in I, aVL, V5 and V6 with S or s wave in inferior leads [1]. Tada et al. has demonstrated that success rate of RF catheter ablation for VT/PVCs originating from lateral segment of tricuspid annulus are higher than for VT/VPCs of septal origin (90 % vs 57 %) [2]. Septal origin of PVCs are more common than lateral free wall PVCs. We used a decapolar catheter to precisely localise the origin of TA PVCs where activation of RV body and outflow was clearly late as compared to RV base. Catheter stability is always an

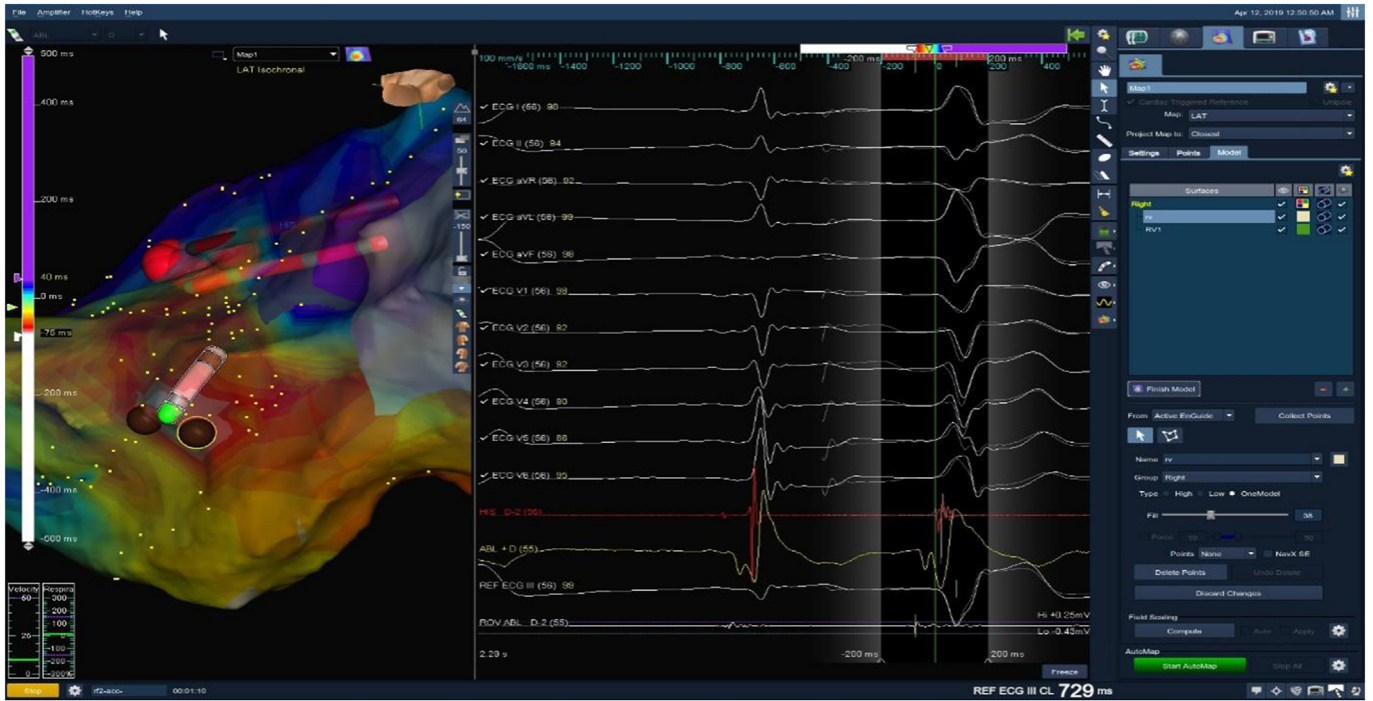


Fig. 4. Local VEGM preceded Surface QRS by 48 msec.

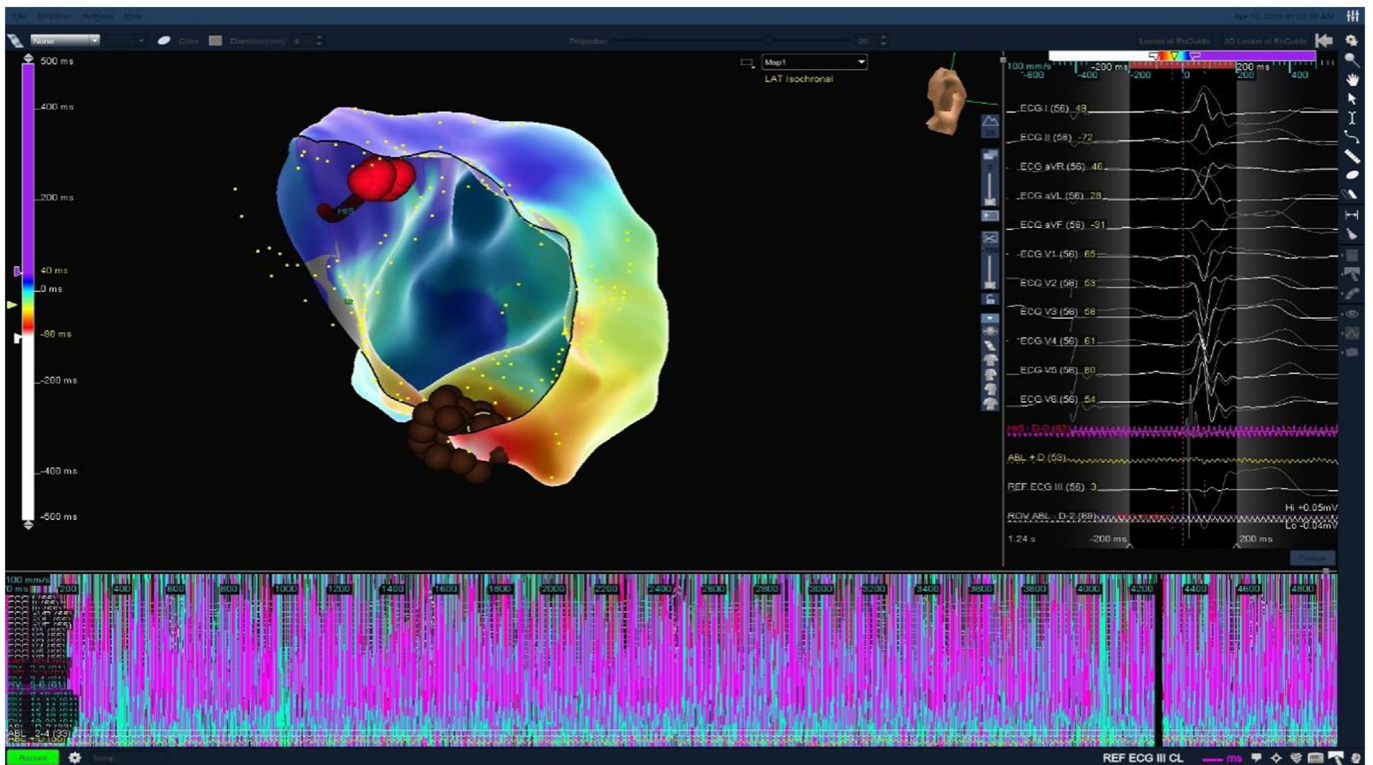


Fig. 5. Ablation lesions in TA PVCs.

issue during sub tricuspid mapping. We adopted an anchoring manoeuvre with flexion of the catheter tip below the ventricular surface of tricuspid annulus and rested the loop at the junction of tricuspid annulus and septal leaflet to achieve better stability without much manipulation. A long sheath is always needed for

better support and stability during radiofrequency ablation of such TA PVCs. In difficult cases, a superior trans jugular approach with long sheath is recommended to ablate those PVCs [3]. Tricuspid annular PVCs may be a presenting feature of ARVC, RV Cardiomyopathy or RV Noncompaction [4] besides also being idiopathic in

nature. Cardiac catheterization and MRI play a major role before RFA in ruling out ARVC or excessive trabeculations in RV in non-compaction. Idiopathic RV PVCs although benign in nature and can be treated by both drugs and radiofrequency ablation, ICD plays an important role in those PVCs associated with ARVC or RV non-compaction. As reported in Tada and Van Herendal et al. [5], tricuspid annular PVCs are usually associated with preserved biventricular function. TA PVCs producing LV systolic dysfunction has also been reported [6]. We treated the patient with radiofrequency ablation due to high PVC burden of 33%. Baman et al. [7] advised radiofrequency ablation in patients with PVC burden of more than 24 % as most of the time those cases are associated with cardiomyopathy. Chen et al. demonstrated most of those TA PVCs origin at 6–8 o'clock position as explicitly demonstrated in our case. Myocardium gets depolarized in a direction towards the anode of lead aVL, away from inferior leads and vertical towards aVR [8] which might account for the morphology of PVCs in our patient's surface electrocardiogram (EKG). Retrograde sub tricuspid approach which we adopted in this patient, is an effective approach to reach this unusual site and this technique is also reported to be promising in ablation of parahisian PVCs [9].

5. Conclusion

We presented a rare case of tricuspid annular PVCs successfully ablated at posterolateral tricuspid annulus (TA) with retrograde sub tricuspid approach with better catheter stability and contact. Tricuspid annular PVCs although less common than RVOT VPCs, it can be approached and ablated with this novel technique using 3D mapping with quite good success and outcome.

Disclosure

None.

Declaration of competing interest

None.

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