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Catheter Ablation of an Unusual AP in LAA Redge Mimicking VOM; An Interesting Case

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ABSTRACT

Introduction: Incessant Atrial Tachycardia (AT) is a relatively abnormal arrhythmia, but it is a well-known cause of Tachycardia-Induced Cardiomyopathy (TICMP).
Case Presentation: This case study was carried out on a patient who was suffering from focal AT originated from the Vein of Marshal (VOM) leading to TICMP, which was targeted from the endocaridal side of the left atrium through the left atrial ridge. One-year follow-up of the patient showed no evidence for the recurrence of AT. Meanwhile, improvement in Ejection Fraction (EF) was quite evident in echocardiography during follow-up.
Conclusions: This rare case study included a patient with AT, assuming to have originated from the Ligament of Marshal (LOM), with an unexpected P wave morphology.

1. Introduction

Studies have confirmed that Vein and Ligament of Marshall (VOM/LOM) play an important role in adrenergic Atrial Tachycardia (AT) and that Atrial Fibrillation (AF) is caused by LOM-Pulmonary Vein (PV) connections in complex activation patterns (1-3). These data that may be considered as a source of beats triggering AF indicate that the LOM could be used for therapeutic purposes (4, 5).

Incessant Atrial Tachycardia (AT) is a relatively abnormal arrhythmia, but it is a well-known cause of Tachycardia-Induced Cardiomyopathy (TICMP). This case study was carried out on a patient who was suffering from focal AT originated from VOM leading to TICMP, which was targeted from the endocaridal side of the Left Atrium (LA) through the left atrial ridge.

2. Case Presentation

A 37-year-old lady who was suffering from heart palpitation for a couple of years undertook the electrophysiological study. Frequent episodes of paroxysmal regular and narrow QRS tachycardia indicating AT were reported according to the clinically documented ECG as well as 24-hour Holter monitoring (Figure 1). The morphology of P wave, positive in VL, I and negative in V1, was consistent with the right-sided origin of arrhythmia. Although anti-arrhythmic drugs were administered to the patient, arrhythmia was not controlled. Preserved Left Ventricular (LV) function was also evident in echocardiography (EF = 45 - 50%). Thus, a baseline electrophysiological study was planned to be conducted. Accordingly, a quadripolar catheter was inserted into the Right Atrium (RA) and a multipolar catheter into the Coronary Sinus (CS). During the procedure, it was observed that atrial activation sequence did not change during the spontaneous sustained AT and it was the same as the earliest atrial activation recorded in the mid to proximal CS (Figure 2).

The RA and CS were mapped using a deflectable mapping catheter. It was not possible to trace the source of activation by the conventional activation mapping of RA and CS. Therefore, transseptal puncture was performed and then, an Agilis sheath (St. Jude Medical) was advanced into the LA. Considering the activation mapping, the earliest atrial activation of AT was located at the lateral aspect of the mitral ring (90 msec), but the Radio Frequency (RF) energies delivery was not successful at this site (Figure 3). After that, the earliest activation recorded was 60

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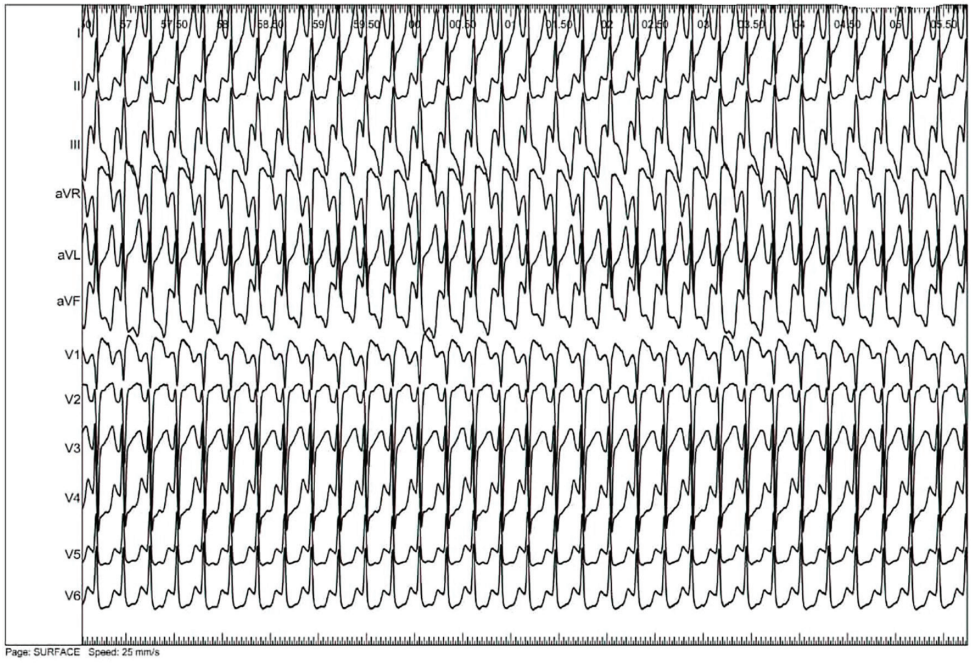

Figure 1. Frequent Episodes of Paroxysmal Regular and Narrow QRS Tachycardia Indicating AT Reported according to the Clinically Documented ECGs as Well as 24-Hour Holter Monitoring

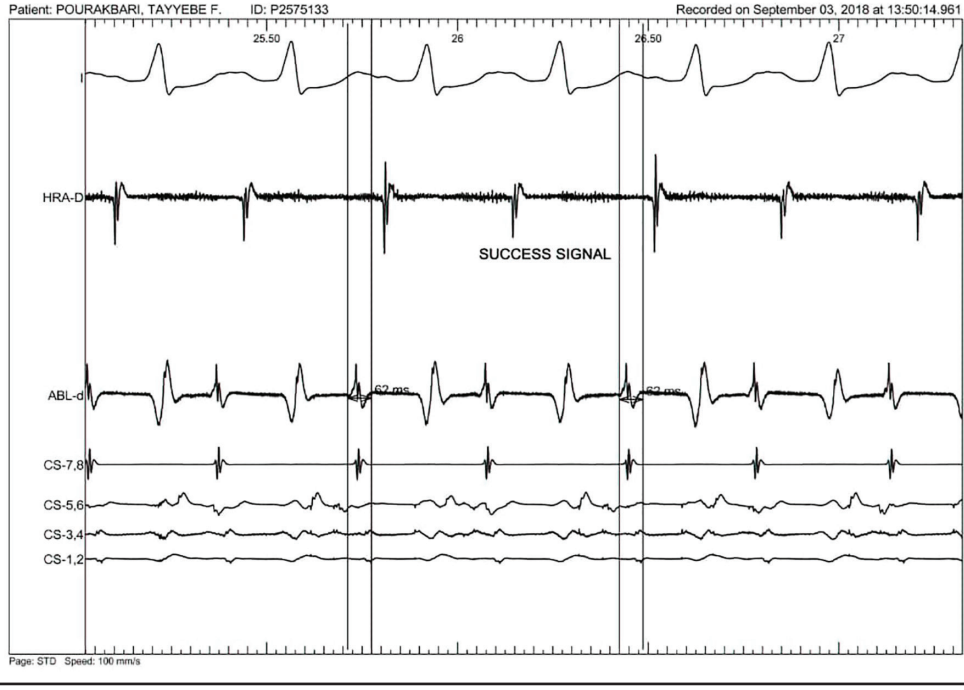

Figure 2. Atrial Activation Sequence during Spontaneous Sustained AT

msec in the inferoanterior aspect of the left atrial ridge at a site consistent with the mid portion of VOM. Catheter manipulation at this region resulted in the termination of tachycardia reproducibly. Therefore, irrigated RF current was applied in the power-control mode at 20 or 30 W with an irrigation flow rate of 17 or 30 mL/min. RF power was titrated up to 40 W, aiming at declining the impedance of 8 to 10 Ω and limiting the temperature to 42 ºC. Application of RF at the site contributed to the termination and non-inducibility of AT (Figure 4).

No evidence of AT recurrence was observed after the one-year follow-up. Echocardiography was also performed during follow-up, in which improvement in EF was demonstrated.

3. Discussion

The anatomical location of the AT focus as well as the subsequent activation pattern within the atrium of origin can help identify P wave morphology on 12-lead ECG during AT. The V1 lead has been considered to be most helpful in determining the likely anatomical position of origin for focal AT. Several morphological P wave characteristics can help differentiate RA from LA foci. The most useful leads for this purpose are VL and V1. RA foci are predicted by a negative or biphasic P wave in lead V1. On the other hand, an RA focus with high accuracy is predicted by a positive or biphasic P wave in lead aVL (6).

Up to now, the clinical characteristics of ATs arisen from

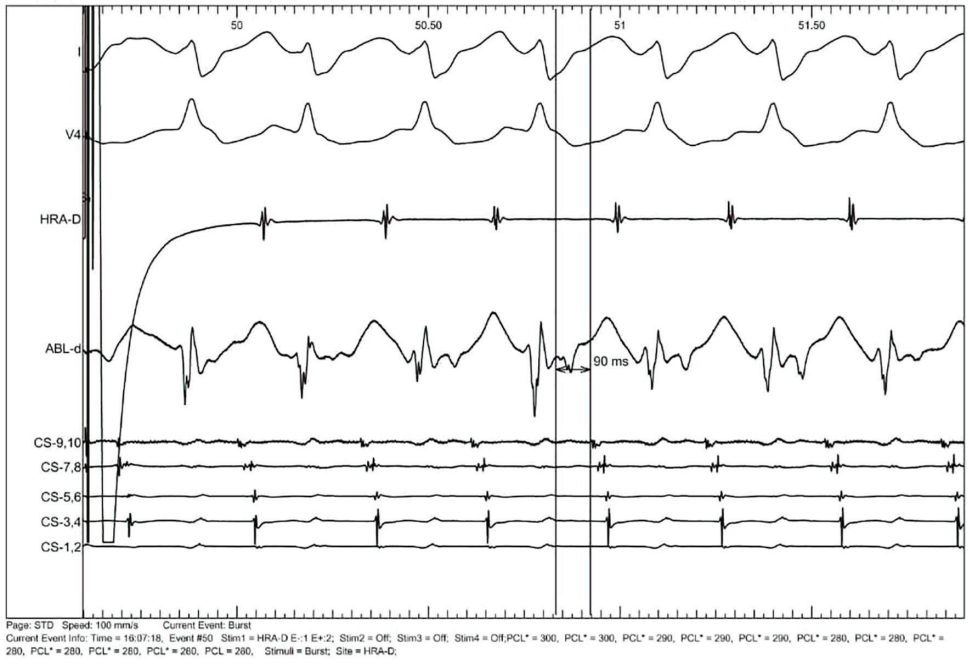

Figure 3. The Earliest Atrial Activation of AT Located at the Lateral Aspect of the Mitral Ring (90 msec)

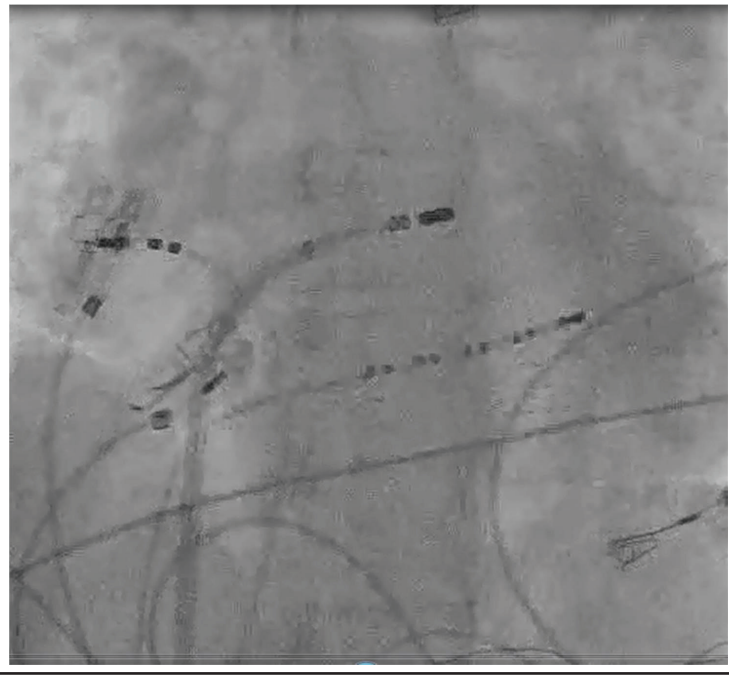

Figure 4. Application of RF at the Site, Contributing to the Termination and Non-Inducibility of AT

LOM have not been explained. Due to the close anatomical proximity, the morphology of P wave has been expected to be similar to that arising from the LA ridge. Chug A et al. explained the role of LOM in patients with AF and the associated arrhythmias (7). It was demonstrated that in case the earliest atrial activation was found along the endocardial course of the LOM or epicardially at the mid-to-distal CS, a focal AT would arise from LOM. In the present case, no confirmation by direct recording of VOM potentials was found for the mechanistic involvement of the LOM. Thus, the mid portion of VOM could be ablated from the inferoanterior aspect of the left atrial ridge below the left inferior pulmonary vein ostium.

Although it has been recommended to place a mapping catheter through the VOM and use it as the anatomical guide, this was not done in the current study. Instead, based on the direction of the catheter in fluoroscopy (in the direction of the left lateral ridge and the left PVs), LOM was mapped via endocardial approach.

3.1. Informed Consent

Inform consent form was obtained from the patient.

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Authors' Contribution

M T, and Z E: designed the study, supervised the study,

and wrote the manuscript.

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