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Utility of the Pulmonary Vein Ablation Catheter for Electrical Isolation of A Left Sided Vena Cava Triggering Atrial Fibrillation

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Abstract

A persistent left sided vena cava (LSVC) can trigger atrial fibrillation. A 41 year old man with paroxysmal atrial fibrillation (PAF) and LSVC had all four pulmonary veins and his LSVC electrically isolated from the left atrium with the Pulmonary Vein Ablation Catheter (PVAC). At follow up patient described no further episodes of AF. Single-shot ablation catheters such as the PVAC maybe successfully and safely used for electrical isolation of a LSVC, though clearly more experience is required to comprehensively evaluate this.

Introduction

Electrical isolation of the pulmonary veins is the cornerstone of catheter ablation techniques for atrial fibrillation (AF). However as well as the pulmonary veins, AF can be triggered from the other thoracic veins including the coronary sinus, superior vena cava, and Vein of Marshall. The most common thoracic venous anomaly is a persistent left sided vena cava (LSVC) which can also be a trigger of AF.[1]

Case Report

A 41 year old man with drug refractory AF was referred to our electrophysiology service. He had experienced AF for several years, with two to three episodes of AF a week, lasting up to 24 hours at a time.

A CT scan of his thorax demonstrated a large LSVC (Figure 1). After a normal electrophysiology study, all four pulmonary veins were ablated and electrically disconnected at their antrum, during paroxysms of AF, utilizing a Pulmonary Vein Ablation Catheter (PVAC, Medtronic, Minneapolis, USA). This is a circular, multielectrode mapping catheter that is also capable of delivering 'duty cycled' radiofrequency energy.[2] Although the veins were disconnected, paroxysms of AF continued. A quadripole catheter was placed deep in the LSVC and this suggested the vein to be electrically active and the site of initiation of AF (Figures 2 and 3). Venography was performed (Figure 4a) and the LSVC electrically disconnected from the coronary sinus with the PVAC after pacing from each pair of bipoles excluded phrenic nerve capture (Figure 4b).

Disclosures:
None.

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During ablation, AF terminated and was not seen again. There were no complications from the procedure and the patient was discharged the following day.

At 2 year follow up the patient had experienced no further episodes of AF without antiarrhythmic drugs.

Conclusions:

'Single-shot' ablation techniques are increasingly used to electrically isolate pulmonary veins. This case illustrates, with appropriate safety considerations, PVAC might also be of use in the electrical isolation

Figure 1: Computed tomography reconstruction of the LSVC(arrow)

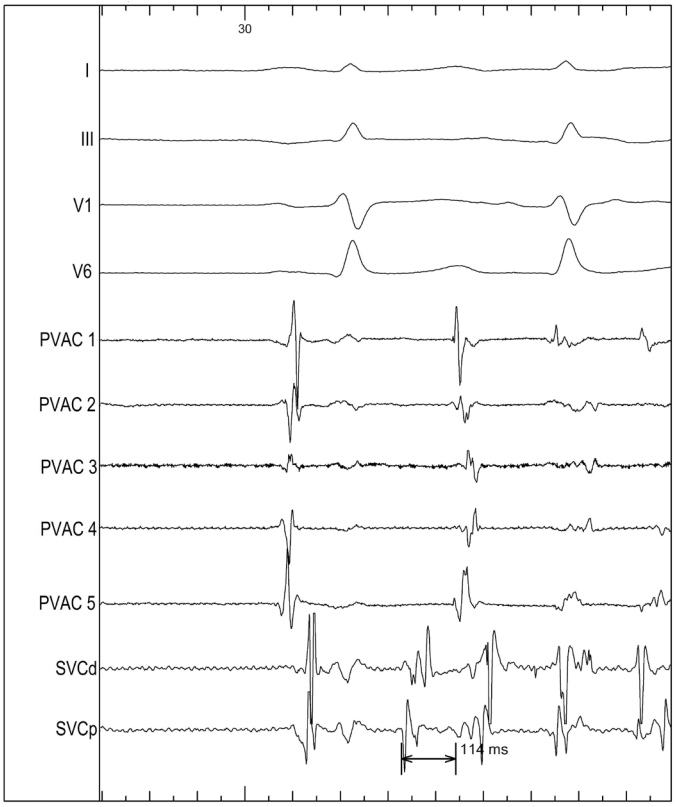

Figure 2: Pulmonary vein ablation catheter (PVAC) in the left atrium (LA) with a quadripole catheter in left sided vena cava (SVC). AF is initiated deep within the left SVC.

of a left sided superior vena cava if this proves to be a trigger of AF.

References:

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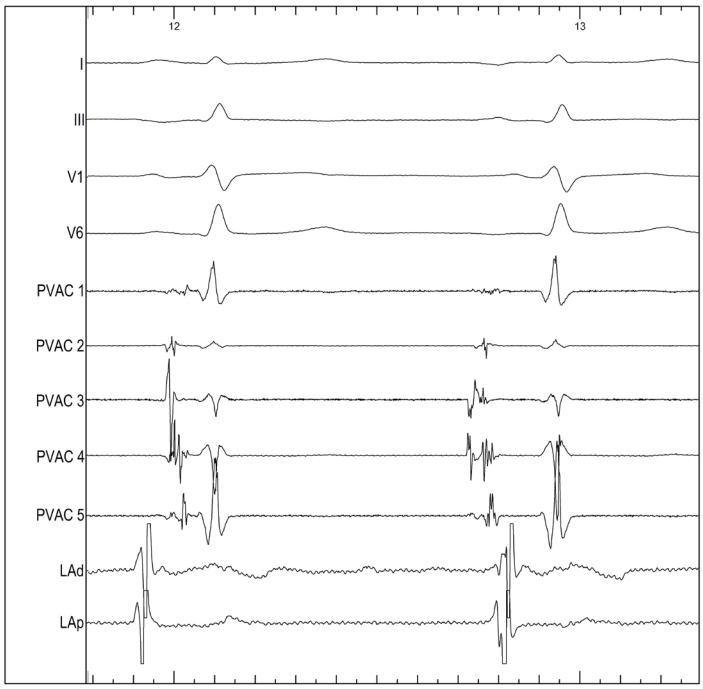

Figure 3: Normal beat and ectopic beat from left sided vena cava (LSVC) with pulmonary vein ablation catheter (PVAC) in LSVC and quadripole catheter now in the left atrium (LA). Note reversal of the local SVC potential generating the ectopic (arrow).

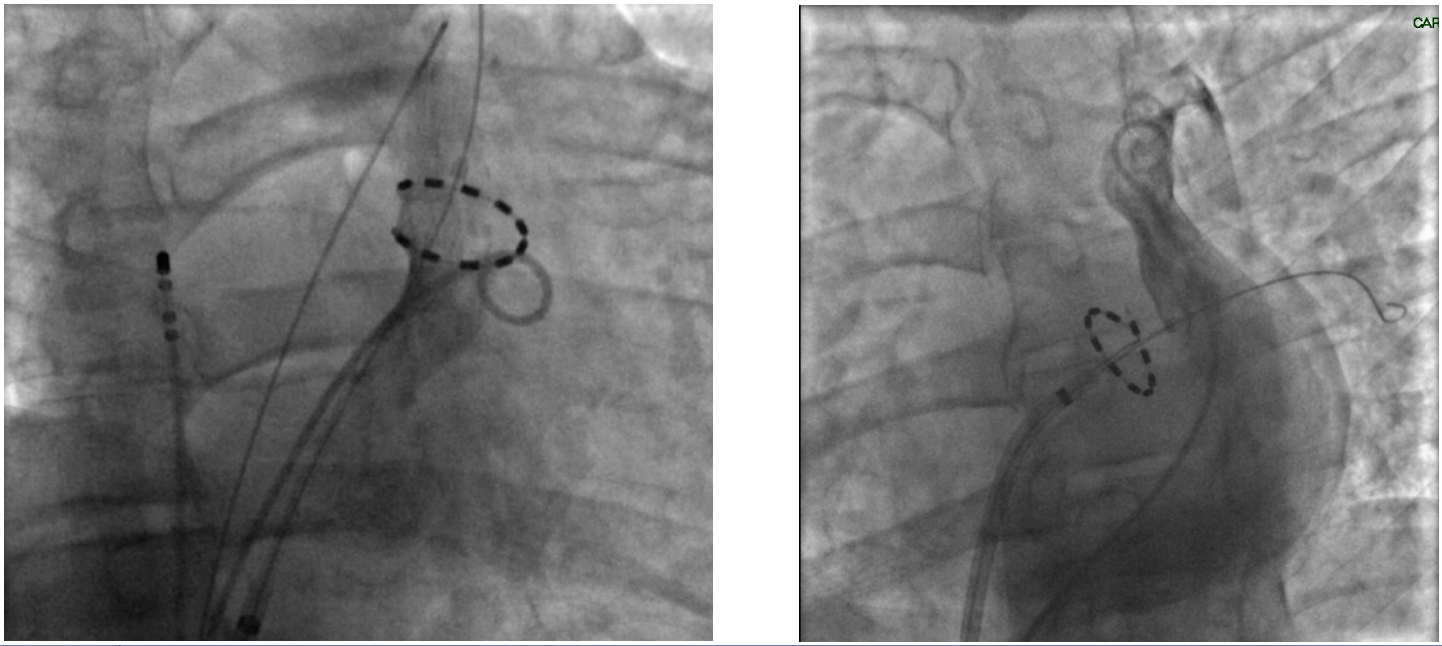

Figure 4: Panel A: venogram demonstrating the left sided vena cava (LSVC). Panel B: venogram of the pulmonary vein ablation catheter (PVAC) and pigtail catheter in the LSVC.