



AV nodal ablation in tricuspid atresia; anatomical challenges



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ABSTRACT

Patients with congenital heart disease often present unique challenges, especially in the electrophysiology laboratory. Here we present a case of a patient with medically refractory symptomatic atrial tachycardia, tricuspid atresia and a history of a modified Fontan procedure. The approach of an AV node ablation for palliation in our patient was met with challenges in identification of a His-bundle recording and successful ablation after identification of the His-bundle recording from a left sided approach. Although a left sided approach is feasible, an anatomically guided right sided approach to ablate the compact AV node may be preferred.

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1. Case report

A 35 year old male with history of tricuspid atresia, bidirectional Glenn procedure at age 9 months, modified Fontan procedure with ASD patching at age 9 years and implantation of a dual chamber permanent pacemaker at age 22 years for sinus node dysfunction. He was diagnosed a month prior to evaluation by the electrophysiology service with poorly differentiated metastatic hepatocellular carcinoma with poor prognosis. The patient was hospitalized repeatedly for symptomatic atrial tachycardia which was refractory to sotalol and subsequently amiodarone.

Palliative AV node ablation was recommended due to limited life expectancy related to metastatic hepatocellular carcinoma and the patient's wishes to return home for palliative care. Since modified Fontan procedure preserves access to the right side of the septum, femoral venous access was first obtained. Contrast venography (Fig. 1) showed a patent Fontan shunt and inferior atrial septum where we placed a mapping/ablation catheter.

Extensive mapping of the interatrial septum was performed on the right side where a His signal could not be recorded. Attempted ablation based on anatomical landmarks was not performed at that point because success was felt to be potentially limited using a purely anatomical approach and a left sided approach was attempted. Femoral arterial access was obtained and a second

mapping/ablation catheter was deflected in to morphologic left ventricle in the region of non-coronary cusp of the aortic valve, close to the right coronary cusp, where a clear His signal and atrial electrogram of the tachycardia were recorded (Figs. 2 and 3).

Radiofrequency ablation was attempted at this point using a 5mm tip non-irrigated ablation catheter and a temperature controlled ablation system with a maximum temperature of 65 °C and power output of 50 Watts. A total of 15 radiofrequency ablation lesions were made in order to achieve complete heart block. The



Fig. 1. Contrast venogram demonstrating a patent Fontan conduit with access to the atrial septum.

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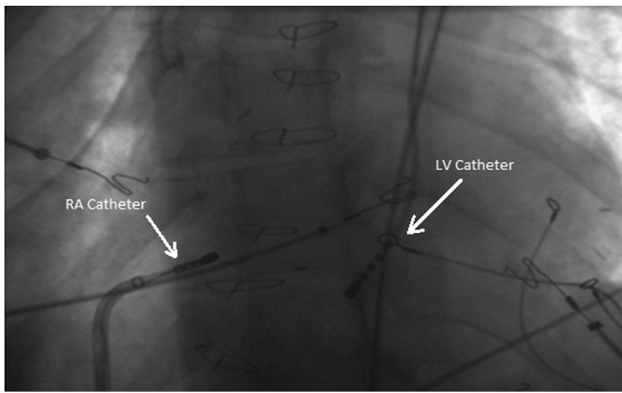


Fig. 2. Fluoroscopy image of the two mapping/ablation catheters with the second catheter advanced into the left ventricle via a retrograde aortic approach in the region of the non-coronary cusp of the aortic valve.

intact heart [2].

The coronary sinus was visible on the venogram (AV node is anterior to this in tricuspid atresia) which prompted attempts at the venous/right sided mapping. Although empiric ablation could have been attempted at this location, absence of far field His signal lead to left sided mapping. Ablation at the site of compact AV node to create complete heart block is faster than ablation of His insulated by central fibrous body. This may have accounted for multiple ablations being required to achieve complete heart block. The anatomic separation between septal/Fontan baffle right atrium and the site of His recording under non coronary cup is seen in Fig. 2.

In a regular Fontan without fenestration, left sided AV node ablation is the procedure of choice [3]. Additionally, the operative note of the procedure, if available, or baffle venogram must be reviewed to understand anatomy prior to ablation.

Atrial tachycardia in patients with a Fontan conduit can be mapped and successfully ablated [4]. However, as a palliative pro-

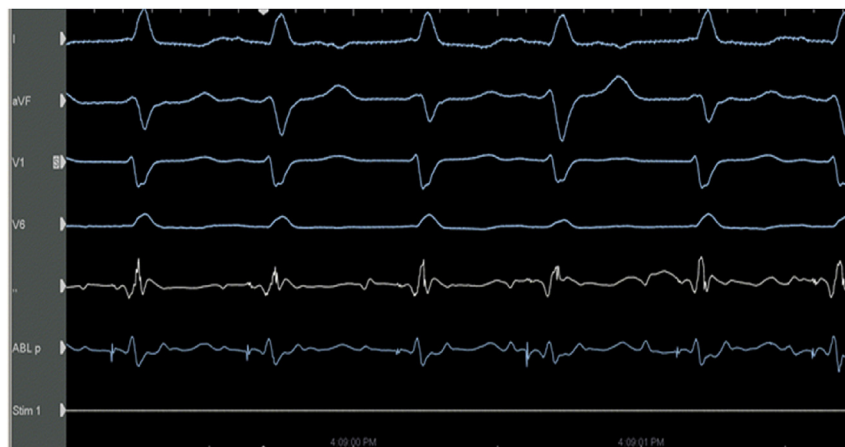


Fig. 3. Surface electrocardiogram as well as intracardiac electrogram recordings from the mapping catheter with the tip located in the left ventricle in the region of the non-coronary cusp of the aortic valve and a clear His-bundle potential is identified.

patient was discharged home the following day and passed away three months afterward from complications related to his meta-static disease.

2. Discussion

Atrioventricular node (AV node) ablation is a highly efficacious procedure in patients with symptomatic atrial arrhythmias refractory to other forms of treatment [1]. In tricuspid atresia, the AV node is located in the usual anatomical location, but the location of the AV node can be significantly displaced in other congenital heart abnormalities. In two autopsy specimens of tricuspid atresia, histologic studies revealed that the AV node was situated adjacent to the central fibrous body in the floor of the right atrium recognized by a dimple (possible site of absent tricuspid valve) in

cedure or if medication and ablation modalities fail, AV node ablation is effective and safe.

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