

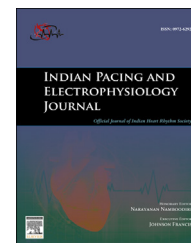
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Ablation of an orthodromic reentrant tachycardia via a concealed accessory pathway targeted in the non-coronary sinus

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coronary sinus will ablate either the atrial insertion on the interatrial septum or the accessory pathway (AP) which has its course between the atrial and ventricular insertion [2].

We report a case of a parahisian concealed accessory pathway with successful radiofrequency ablation of the earliest atrial activation at the level of the non-coronary sinus; and with no consequent injury to the AV conduction system.

Case report

A 17-year-old previously healthy boy presented with a four years history of frequent palpitations. He was diagnosed with narrow complex tachycardia with a maximal heart rate of 250 beats per minute. Several medications were tried with no improvement of his symptoms. He was then referred to our center for the conduction of an electrophysiological study and radiofrequency ablation. His physical exam is completely normal and his electrocardiogram (ECG) showed sinus rhythm with no evidence of pre-excitation.

Electrophysiologic study

After an informed consent was obtained, the procedure was performed under conscious sedation and local anesthesia. The patient arrived to the electrophysiology lab in sinus rhythm, with unremarkable baseline intervals. Retrograde VA conduction was present, with the earliest atrial activity in the proximal poles of the coronary sinus (CS) catheter. Also, a reproducible and easily inducible orthodromic atrioventri-

Introduction

Radiofrequency ablation of accessory pathways is the treatment of choice in symptomatic patients [1]. The challenge lies in locating the pathway and ablating it without any damage to the surrounding tissue. Parahisian pathways are difficult and challenging to treat. Their ablation requires an experienced and careful operator because of the proximity to the atrioventricular (AV) node. Although the success rate in ablation procedures in general is very high, any injury to the AV node can lead to the placement of a permanent pacemaker.

To our knowledge, targeting the non-coronary sinus for ablation of accessory pathways was discussed in only a few cases in the literature [2,3] with only one reported case whereby the accessory pathway was concealed and successfully targeted in the non-coronary cusp [2]. Ablating the non-

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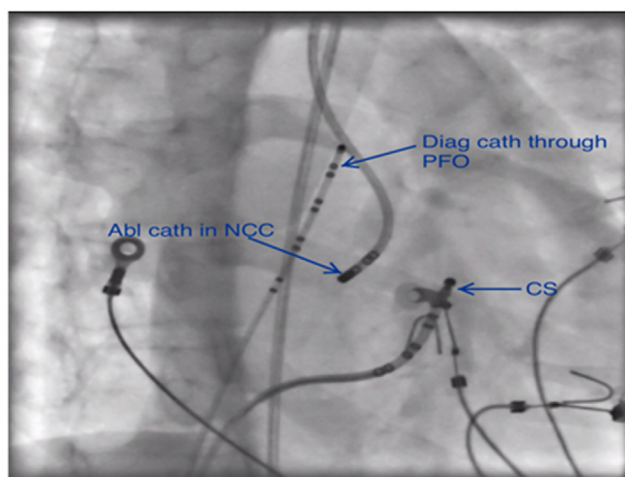


Fig. 1 – Ablation catheter at the level of the non-coronary cusp (NCC). PFO, patent foramen ovale. CS, coronary sinus.

cular reentrant tachycardia (AVRT) with early retrograde atrial activity was seen on the distal his catheter.

The diagnosis of atypical atrioventricular node reentrant tachycardia (AVNRT) was unlikely since PPI–TCL was less than 115 ms and due to the fact that there was mild advancement of atrial activation with premature RV stimuli during His refractoriness. A ventricular overdrive pacing maneuver was done, which resulted in a VAV response. This ruled out atrial tachycardia and with the finding of a PPI–TCL at 70 ms was in favor of an orthodromic reentrant tachycardia utilizing a concealed accessory pathway. The VA time and the RR cycle were minimally changed with the patient's tachycardia. There was evidence of wobbling and alternating conduction between the fast and the slow pathway anterogradely, thus in turn ruling out AVNRT. The tachycardia was observed to terminate spontaneously with an atrial signal, thus restarting again in an incessant fashion and even inducing atrial fibrillation several times.

Detailed mapping of the tricuspid annulus during tachycardia was made utilizing the 8 Fr thermocool irrigated mapping/ablation catheter. This showed that the site of earliest atrial activation in tachycardia was at the His bundle level, confirming that the patient's pathway is Parahisian. Low energy ablation close to the best site was attempted once, however it was not successful.

At this point, we decided to proceed to the left atrium (LA); and the ablation catheter was maneuvered through the patent foramen ovale (PFO) into the left atrium. Detailed mapping of the mitral annulus was made, including the anteroseptal region. The left atrial activation was not noted to be earlier than the right sided one (i.e., the His bundle region). Thus, we decided to map the aortic sinuses, specifically the non-coronary sinus. The His catheter was moved through the PFO into the LA so as to keep access on the left side. An 8 Fr arterial access was obtained, and then the mapping catheter was advanced into the aorta to the left ventricle in a retrograde fashion. Once again, the mitral annulus was mapped revealing that the pathway is not around the mitral valve. The catheter was retracted to the aortic valve and extreme counterclockwise rotation with a gentle deflection led the tip to the non-coronary sinus (Fig. 1).

Detailed and gentle mapping of the non-coronary sinus was performed, uncovering the earliest farfield atrial activation (Fig. 2).

A 25 W irrigated lesion was delivered to the non-coronary sinus area, causing intermittent interruption of the tachycardia after 15 s of ablation. Afterwards, the energy was increased to 35 W for a total of 90 s thus causing complete resolution of the tachycardia. Three other lesions of 35 W, each lasting 60 s were then delivered around the same region.

The tachycardia never recurred even after multiple maneuvers. After the ablation, VA conduction via the AV node was sustained; however it was at longer cycle lengths. No accessory pathway conduction was noted and there was no inducible tachycardia.

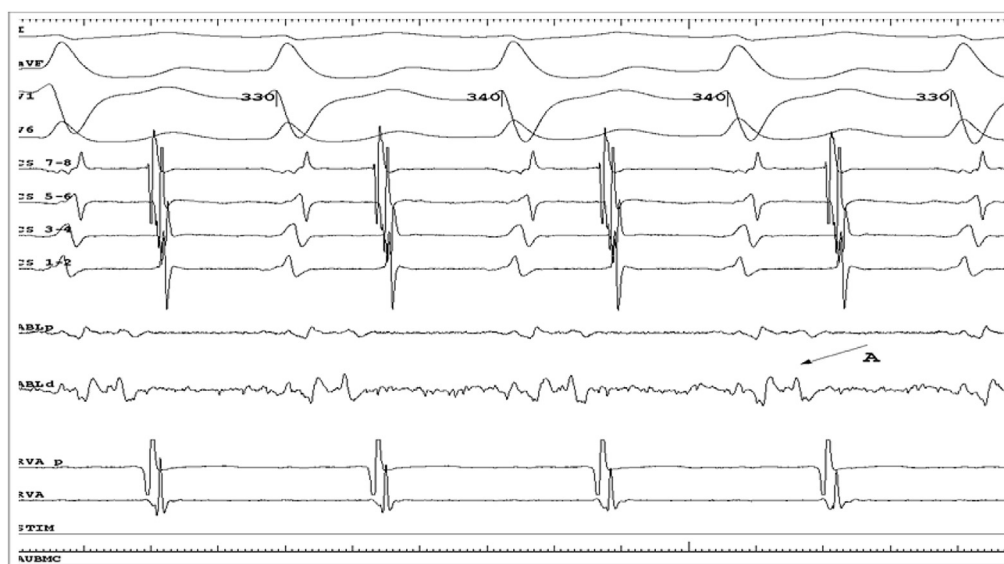


Fig. 2 – Intracardiac tracing showing the earliest signal (A) on the distal ablation catheter.

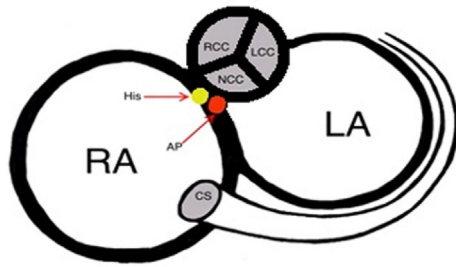


Fig. 3 – The location of the aortic annulus and its non-coronary cusp (NCC) relative to the right atrium (RA), left atrium (LA), interatrial septum, and the His bundle. The location of our accessory pathway (AP) is also schematically represented. RCC, right coronary cusp; LCC, left coronary cusp.

Discussion

Catheter ablation of accessory pathways was described by Jackman et al. in 1991 [1]. However, as previously mentioned, very few reports discuss the ablation of accessory pathways by targeting the non-coronary sinus of the aortic valve [2,3]. To our knowledge, only one case of concealed accessory pathway targeted in the NCC was reported in the literature [2]. Since it is a concealed pathway, it could not have been identified on the electrocardiogram. The electrophysiologic study with the detailed mapping revealed that the pathway is parahisian and the non-coronary sinus identified the earliest atrial signal.

The aortic annulus has a central location in the heart. The non-coronary cusp is particularly unique in that it has a close anatomic relationship with the left atrium, right atrium, interatrial septum, membranous interventricular septum, and the tricuspid annulus (Fig. 3).

Accessory pathways can connect the atrial and ventricular myocardium at most sites along the AV annuli, however an AP at the anteroseptal region constitutes an exception due to the presence of the aortic valve at that site [2].

Anteroseptal APs are rare and constitute only 8% of all APs. They have a lower success rate and higher recurrence rate (14–17%) post ablation in comparison to other APs. In addition, they pose a significant injury risk to the AV conduction system during the procedure [4].

APs in the NCC are rare and have an unknown exact incidence. This might be the reason why some “right anteroseptal pathways” require prolonged ablation times under high energy and why they still recur despite an initial conduction block [2].

It has been shown that the NCC may have some atrial myocardium [5], this may be able to explain why our approach resulted in successful ablation. Another possibility is that the NCC might act as a vantage point that stabilizes the ablation catheter to allow the targeting of the neighboring atrial or ventricular myocardium.

Conclusion

There are very few reports in the literature describing ablation of accessory pathways from the non-coronary sinus with only one paper describing that pathway being a concealed one. Our case was an orthodromic reentrant tachycardia via a concealed accessory pathway located in that structure. Radiofrequency ablation targeting the non-coronary sinus was successful without any damage to the coronaries or the AV conduction system. Three months later the patient was seen in the clinic and he reported that he was free of tachycardia.

Conflict of interest disclosures

Kinan Carlos El Tallawi, MD: none. Bernard Harbieh, MD: none. Maurice Khoury, MD: none. Bernard Abi-Saleh, MD, FHRS: none.

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