



Contents lists available at ScienceDirect

Indian Pacing and Electrophysiology Journal

journal homepage: www.elsevier.com/locate/IPEJ

Editorial Commentary

Cryoablation: Another arrow in the Ablationist's Quiver

Right free wall is a common location for atrioventricular pathways. Accessory pathways located along the right free wall are less likely to be concealed, are more likely to have a longer retrograde effective refractory period and to show anterograde decremental conduction, and are less likely to be associated with orthodromic reentrant tachycardia and inducible atrial fibrillation than pathways in other locations [1]. More importantly, pathways in this location have a lower acute and long-term success rate after targeted ablation than pathways in other locations [2–5].

Several factors account for the reported higher ablation failure rates in patients with pathways along the right free wall. Lack of a reference catheter, ablation catheter instability along the tricuspid valve annulus and anisotropic conduction velocity have been reported as major factors [6]. In addition to catheter stability, epicardial location of pathways along the right free wall could also impact the success of endocardial ablation procedure [6,7].

In order to improve the success rate of procedures along the right free wall, several strategies have been employed. They include use of multipolar catheters along the tricuspid valve annulus [8], use of 3-dimensional electroanatomic mapping systems [9], targeting the atrial insertion of the pathway [10], an under the valve approach to target the ventricular end of these pathway [11,12] and cryoablation for catheter stability [13,14].

Cryoablation for all types of supraventricular tachycardia substrate elimination is common practice and widely adopted in pediatric ablations [13–15]. Virk et al. published a case series in this issue of the journal [16] demonstrating that cryoablation was successful in eliminating arrhythmia target along the right free wall in 4 patients who had previously unsuccessful radiofrequency ablations. They presume that this is due to increased stability due to cryoadhesion. Cryoadhesion and there by catheter stability is only one factor required for successful ablation. Other factors include activation time mapping, unipolar and bipolar electrogram characteristics, and identification of the accessory pathway potential. Cryoablation suffers from several limitations including overall lower acute and long-term success rate for accessory pathways when compared to radiofrequency ablation [17]. Moreover, studies have shown that cryoablation lesions produce a smaller acute edema volume than radiofrequency lesions [18] and therefore may not be able to successfully target accessory pathways located deeper in the tissue as well as epicardial pathways which have been reported along the right free wall. The authors fail to provide important details regarding method of mapping (pre-excited sinus rhythm, ventricular pacing or during tachycardia), electrogram characteristics, the time to accessory pathway elimination and the temperature at which the pathways were eliminated, all of

which are critical features in an ablation procedure [13].

Given the low risk of atrioventricular block with use of radiofrequency energy along the right free wall, several additional strategies can be utilized to enhance the success of the procedure in difficult cases of arrhythmia recurrences. These strategies include cooled tip radiofrequency ablation [19], open window mapping [20] and force sensing catheters. Choo et al. showed that overall mean contact force along the tricuspid annulus was lower than the mitral annulus with the lowest contact force along the right anterolateral free wall [21]. In our experience and that reported by Dalal et al., a contact force of between 10 and 15 g at the site of earliest activation is associated with high likelihood of a successful lesion [22]. In this case series, ablation was attempted with force sensing catheters in two patients (Patient #1 and Patient #4). It appears that it was the use of a force sensing catheter and not cryoablation that resulted in successful ablation in patient #4. Finally, in addition to catheter contact and stability, the importance of careful point by point mapping, accurate electrogram localization, atrial and ventricular electrogram ratio, identifying pathway potential and using both bipolar and unipolar electrograms to guide ablation cannot be emphasized enough.

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Peer review under responsibility of Indian Heart Rhythm Society.

<https://doi.org/10.1016/j.ipej.2021.08.004>

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Utkarsh Kohli

Department of Pediatrics, Division of Pediatric Cardiology, West Virginia University School of Medicine and West Virginia University Children's Hospital, Morgantown, WV, United States

Maully Shah*

Department of Pediatrics, Division of Pediatric Cardiology, The Children's Hospital of Philadelphia and University of Pennsylvania School of Medicine, Philadelphia, PA, United States

* Corresponding author. Cardiac Center, The Children's Hospital of Philadelphia, 3401 Civic Center Blvd, Philadelphia, PA, 19104, United States.

E-mail address: shahm@chop.edu (M. Shah).