Electroanatomic mapping-guided catheter ablation of supraventricular tachycardia in children with Ebstein's anomaly

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Background: In Ebstein's anomaly(EA), arrhythmias are common, tachycardia substrates are complex, and accessory pathway(AP) ablations are often challenging. Recent advances in electroanatomical mapping technologies have decreased or eliminated fluoroscopic exposure during catheter ablation procedures.

Objective: This study demonstrates the utility of the EnSite Velocity cardiac mapping system(St. Jude Medical, St Paul, MN) in the catheter ablation of supraventricular tachycardia (SVT) in children with EA.

Methods: Twenty patients (Female/Male = 8/12) with EA who underwent catheter ablation guided by the EnSite-Velocity system between December 2011 and December 2016 were retrospectively evaluated.

Results: Patient median age was 11.5 years (range: 2 years 9 months–18 years), and the median weight was 41 kg (range 11–73 kg). Five patients had severe EA (two in the univentricular repair pathway - fontan palliation), two had moderate EA, and thirteen had mild EA. Fourteen patients (70%) presented with Wolff-Parkinson-White(WPW) syndrome-related SVT, four (20%) with wide QRS tachycardia, and two with narrow QRS tachycardia. The most common indications for ablations were palpitations/syncope and treatment-resistant arrhythmias. Thirty-one tachycardia substrate foci (21 manifest WPW non-decremental-AP, 2 concealed-AP, 4 Mahaim-AP, 3 focal atrial tachycardias, and 1 typical atrioventricular nodal reentrant tachycardia) were detected in twenty patients in the electrophysiological study. There were multiple tachycardia substrates in eleven patients (55%). All WPW patients had right-sided APs (most commonly right posterior-posteroseptal), and six (6/14, 43%) of these patients were high risk. The patient-based acute procedure success rate was 19/20 (95%), and the tachycardia-based success rate was 30/31 (97%). The mean procedure time was 170 ± 43 min (range: 90–265), and fluoroscopy was not used in 15 (75%) patients. The mean fluoroscopy time in the remaining five patients was 3.6 ± 2.9 min(range:0.7–7.8). During a mean follow-up of 35.1 ± 20.3 months (range:6–60), tachycardia recurred in four patients(4/19, 21%), two of whom underwent a second successful procedure. No complications were seen.

Conclusion: Catheter ablation of arrhythmias can be performed effectively and safely in pediatric EA patients by using a limited fluoroscopic approach with the help of electroanatomical mapping systems. However, the rate of tachycardia recurrence at follow-up remains high.