Successful Ablation for Double-loop Intra-atrial Reentrant Tachycardia Utilizing Ripple Mapping in Pediatric Congenital Heart Patient

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Introduction: Intra-atrial reentrant tachycardia (IART) is a common arrhythmia after surgical repair of congenital heart defects. Multiple IART circuits can be found in these complex patients. Therefore, to identify precise isthmus location of the circuit is crucial for aiding radiofrequency (RF) ablation. Ripple mapping is a novel method of 3D intracardiac electrogram visualization which could help displaying location of interest or channel for RF ablation. We report a case of post-operative congenital heart patient with successful RF ablation of double-loop IART using Ripple mapping.

Methods: 

Result: A 9-year-old girl who underwent repair of Double Outlet Right Ventricle (Tetralogy of Fallot type) presented with palpitation and progressive dyspnea for 1 week. Baseline ECG showed IART, atrial rate 250 bpm with rapid ventricular response. Betablocker was introduced to control ventricular rate initially. EP study and RF ablation was performed after transesophageal echocardiogram yielded no intracardiac thrombus with mild degree of pulmonary stenosis and regurgitation, moderate tricuspid regurgitation, fair right ventricular function and borderline left ventricular function (LVEF 50-55%). Anticoagulation was given throughout procedure as standard protocol. IART cycle length was 240 milliseconds. Ripple mapping was created with Pentaray catheter. Scar area was identified at inferolateral right atrial wall. Ripple map showed double-loop tachycardia consisting with counterclockwise loop around tricuspid valve annulus simultaneously with clockwise loop through inferolateral scar of right atrium (RA). Ripple map identified common slow conduction zone at inferolateral wall as shown in figure where two identified circuit circling pass each other. Delivery of single RF application using irrigated ablation catheter with energy of 30 watt resulted in instant termination of tachycardia. After RF application, there was no further inducible tachycardia. Left ventricular function was improved after restoration of sinus rhythm. After 8 months follow up, there has been no recurrence of IART.

Conclusion: Multiple intra-atrial reentrant tachycardia circuit can be seen in complex congenital heart patient especially after surgical repair. Utilizing Ripple mapping or novel 3D intracardiac electrogram visualization can help locating precise slow conduction area or isthmus to be targeted for ablation.