Catheter ablation of atrial arrhythmias by using a multipolar grid-patterned high density mapping catheter in patients with congenital heart disease: a single-center experience

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Funding Acknowledgement: Type of funding sources: None.

Objective: Catheter ablation of arrhythmias in patients with congenital heart disease (CHD) remains challenging and time-consuming. A novel diagnostic catheter with a multipolar grid-patterned electrode configuration for high density mapping may reduce mapping time and enhance ablation success. Here we describe our experience of catheter ablation by using a multipolar grid-patterned mapping catheter in patients with CHD suffered from atrial tachycardia.

Methods: All patients with CHD underwent catheter ablation for atrial tachycardia by using multipolar grid-patterned high density mapping catheter between 04/2018 and 12/2021 were enrolled. Primary success was defined as non-inducibility of atrial tachycardia. Only the first catheter ablation was included in the study.

Results: A total of 37 consecutive patients (median age 34.2±33.0 years (range 7–65), female n=20) underwent 37 ablation procedures with initial high density mapping. The underlying heart defects were s/p ASD-closure (n=2), ASD-closure and corrected partial anomalous pulmonary venous return (n=2), corrected unroofed coronary sinus (n=1), pulmonary valve commissurotomy (n=2), repaired Tetralogy of Fallot (n=2), tricuspid and pulmonary valve replacement in PA/IVS (n=1), mitral valve replacement (n=1), Hypoplastic right heart syndrome (n=1), atrial switch procedure for dTGA (n=7), TA with Glenn shunt (n=1), Ross operation (n=1), Fontan palliation (tricuspid atresia n=6, DILV n=5, HLHS n=1, DORV n=1, dTGA n=1, criss-cross heart n=1, single ventricle n=1). A history of previous ablation was positive in 8 patients. During mapping of the cardiac chambers, the mean value of total collected points and used points were 32657.8±46171 and 3851.6±3295.5 respectively. Mean mapping and fluoroscopy time were 62.1±40.7 minute (range 3–176) and 11.4±8.5 minutes (range 0–32.2), respectively. There were 69 atrial tachycardia substrates in the 37 patients (median 2, range 1–4 per patient). All tachycardia substrates were completely ablated in 33/37 (89.2%) patients and partially in 4/37 (11.8%) patients. Acute success was achieved with successful ablation of 65 of 69 (94.2%) atrial substrates. During a median follow-up time of 20 months (range 5–49), recurrence rate was 5/65 (7.7%) atrial substrates in 5/37 (13.5%) patients. Comparison of 16 patients with Fontan palliation to the 23 patients without Fontan operation showed higher partially success rate in the patients with Fontan palliation (4/16 vs. 0/21, p=0.028).

Conclusion: In this series, high density mapping allowed elucidation of the tachycardia mechanism in all patients with a high primary ablation success, a limited radiation exposure and a low rate of arrhythmia recurrence.