Outcome of catheter ablation of arrhythmias in adult congenital heart disease with high density multi-electrode mapping with automatic annotation algorithm

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Introduction: Arrhythmias are frequently encountered in adult congenital heart disease (ACHD) and respond poorly to pharmacological therapies. Catheter ablation is challenging due to anatomical variation and complexity of the arrhythmia substrate. High density multi electrode mapping (MEM) with automatic annotation of activation time may aid mapping of arrhythmia, decrease procedure time and improve the accuracy of targeting of ablation therapy.

Purpose: To compare the acute and long term outcomes and procedural characteristics of catheter ablation in ACHD patients with and without automatic annotation of activation with MEM.

Methods: Retrospective analysis of the acute and long term outcomes of ACHD patients in a single centre undergoing ablation procedures from 1 Jan 2014 to 18 August 2017 was undertaken. 2 groups were identified.

Group 1 included patients who had arrhythmia mapping performed with the CARTO 3D electroanatomic mapping system without the use of automatic signal annotation. Most patients in this group had sequential mapping performed with the ablation catheter (78%), the rest had multi-electrode mapping with the PentaRay 20 pole catheter.

Group 2 included patients who had arrhythmia mapping performed with the CARTO 3D electroanatomic mapping system using the automated CONFIDENSE mapping algorithm.

Results: Group 1: n = 27, mean age 44.6 +/-3 years. Male 46.6%. Group 2: n = 38, mean age 44.0 +/- 1.9 years. Male 56.7%. All patients had CHD of at least moderate complexity. 25% of patients in group 1 and 45% in group 2 were repeat ablations. 45 arrhythmias were induced in group 1 of which 29 were targeted and 74 arrhythmias were induced in group 2 of which 46 were targeted. Acute success rates (after attempts at reinduction) were 96.3% in group 1 and 94.7% in group 2. Recurrences of arrhythmia occurred significantly less in patients in group 2 compared to group 1 (44.7% and 70.4% respectively, $p < 0.05$) after a follow up duration of 17.3+/-0.43 months in group 2 and 45.3 +/-1.19 months in group 1. Fluoroscopy time, procedure time and ablation time were not significantly different between groups.

Conclusions: The use of multi-electrode mapping with an automatic annotation algorithm was associated with a significantly lower risk of recurrence during the follow up period of this study.