UTILITY OF ULTRA-HIGH DENSITY ACTIVATION MAPPING FOR ABLATION IN CONGENITAL HEART DISEASE COMPARED TO STRUCTURALLY NORMAL HEARTS

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Background

- ACHD population is growing and incidence of lifetime IART nearly 63%

- Current EAM systems are limited by their ability to accurately define the tachycardia circuit

- This can be a particular challenge in patients with complex CHD and affect procedure times
Background

8x smaller ELECTRODES\(^1\)
Maximize contact and minimize far field.
See the clearest map possible.

0.4 mm\(^2\) printed ELECTRODES
Get sharper, better-quality signals for precise localization of arrhythmias.

Effective for the most complex arrhythmias
INTELLAMAP ORION™ MAPPING CATHETER

64 printed ELECTRODES
Collect more data more rapidly.
Hypothesis

Rhythmia mapping system would significantly reduce procedure times in CHD patients without effecting safety and procedure outcomes
Objectives

Aimed to assess

• Procedural Metrics
• Safety
• Outcomes
Methods

• Retrospective analyses of consecutive patients undergoing atrial arrhythmia ablation using Rhythmia mapping system

• Single Centre, 12 months, single operator

• Cases:
  - ACHD patients undergoing AT ablation using Rhythmia EAM
  - Normal heart patients undergoing AT ablation using Rhythmia EAM

• Controls:
  - ACHD patients undergoing AT ablation using other EAM
  - Normal heart patients undergoing AT ablation using other EAM
Procedural Practices

- Orion mapping catheter +/- Agilis sheath
- Activation/Substrate mapping
- Arrhythmia induction
- Acute Success: termination of arrhythmia, inability to induce it with provocative tests, BDB
End Points

• Primary End Point
  - Procedure time: ACHD Cases versus Controls
  - Procedure time: Normal heart Cases versus Controls

• Secondary End Point
  – Procedural complications and Arrhythmia Free survival
Results: Study Cohort

**CASES**
- ACHD
  - N = 7
- Normal Heart
  - N = 19

**CONTROLS**
- ACHD
  - N = 7
- Normal Heart
  - N = 19

Matched for age, gender, underlying heart disease, procedure type and operator
Results: ACHD Patients

- ASD (surgical Repair): 43%
- Dysplastic Tricuspid valve: 14%
- VSD with Pulmonary atresia: 14%
- AP Fontan: 14%
- Mustard: 15%
## Procedural Characteristics: ACHD

<table>
<thead>
<tr>
<th>N = 14</th>
<th>CASES</th>
<th>CONTROLS</th>
<th>p - value</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥1 activation map possible, n (%)</td>
<td>6 (86)</td>
<td>5 (72)</td>
<td>0.53</td>
</tr>
<tr>
<td>Number of arrhythmias per patient, mean ± SD</td>
<td>1.5 ± 0.7</td>
<td>1.6 ± 0.8</td>
<td>0.80</td>
</tr>
<tr>
<td>No. of mapped points</td>
<td>12170 ± 5891</td>
<td>5234 ± 1876</td>
<td>0.02</td>
</tr>
<tr>
<td>Map duration, min (mean ± SD)</td>
<td>14 ± 12</td>
<td>29 ± 14</td>
<td>0.05</td>
</tr>
<tr>
<td>Procedure Time, min (mean ± SD)</td>
<td>160 ± 58</td>
<td>238 ± 45</td>
<td>0.004</td>
</tr>
<tr>
<td>Fluoroscopy Time, min (mean ± SD)</td>
<td>6 ± 7</td>
<td>7 ± 5</td>
<td>0.76</td>
</tr>
</tbody>
</table>
Results: Ablated Arrhythmia

ACHD Patients

- CTI dependent Flutter: 57%
- LA Roof dependent AT: 14%
- Mitral isthmus dependent Flutter: 15%
- Focal right septal AT: 14%

Normal Heart Patients

- Pulmonary vein Isolation: 21%
- Left Lateral Pathway: 5%
- AVNRT: 5%
- Micro-reentrant right sided AT: 11%
- Mitral isthmus dependent Flutter: 5%
- LA Roof dependent AT: 21%
- CTI dependent Flutter: 32%
Primary End Point: ACHD

160 ± 58 versus 238 ± 45

p = 0.004
Primary End Point: Normal Heart

138 ± 73 versus 151 ± 63
p = 0.62
Secondary End Point

- Acute Procedural success 100% in both ACHD and Normal Heart Cases and Controls
- No major complications
- Arrhythmia Free Survival at 1 yr follow-up
  - ACHD Cases versus Controls
  - Normal Heart Cases versus Controls
Conclusions

• Ultra high density mapping allows elucidation of tachycardia circuits in complex ACHD, enabling successful treatment at critical isthmus in significantly lesser time than conventional mapping.

• This advantage of shorter procedure times using Rhythmia mapping is not seen in normal hearts.
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