Ablation of Hemodynamically Unstable VT

High Density Mapping Guided VT ablation study

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Disclosure

• Boston Scientific Inc: Consultant
• Abott Medical Inc: Consultant
• Johnson and Johnson : Education consultant
Herzschlag anpassen
Background

• VT Pts can present wide range of clinical presentations from stable and ambulatory status to cardiogenic shock and death.
• These pts have more than one VTs inducible including one or two hemodynamically unstable faster VT during the EP study.
• Until recently, many of these fast VT were considered to be unmappable due to the hemodynamic instability.
• Last few years, several studies shown that the high density mapping (HDM) techniques have been used successfully to map and ablate all inducible VTs.
# HDM VT Ablation Population

<table>
<thead>
<tr>
<th></th>
<th>Unstable</th>
<th>Stable</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total #: 32 pts</td>
<td>25</td>
<td>7</td>
<td></td>
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<tr>
<td>Age</td>
<td>71.4 ± 8.5 yrs</td>
<td>74.8 ± 3.9 yrs</td>
<td>ns</td>
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<tr>
<td>LVEF</td>
<td>28.3 ± 3.6</td>
<td>31.5 ± 6.0</td>
<td>ns</td>
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<tr>
<td>ICD shocks #</td>
<td>17.5 ± 9.3</td>
<td>5.3 ± 1.8</td>
<td>P &lt; 0.001</td>
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<tr>
<td>Amio</td>
<td>14/20</td>
<td>6/7</td>
<td>P &lt; 0.07</td>
</tr>
<tr>
<td>Ischemic CM</td>
<td>16/25</td>
<td>6/7</td>
<td></td>
</tr>
<tr>
<td>Lactic Acidosis</td>
<td>22/25 (88%)</td>
<td>1/7 (14%)</td>
<td>P &lt; 0.001</td>
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All 32 pts had ICD implanted prior to the clinical presentation
Study population

• The majority of pts (17/25) with unstable clinical presentation had associated complications including metabolic acidosis, respiratory failure, renal failure and CHF.

• VT storm pts had larger LVD, lower LVEF, and longer history of CM and significant metabolic acidosis.

• 19 pts were able to stabilize the VT with hemodynamic support and the mechanical ventilator support for more than 48 hrs prior to the VT ablation and had better acute out comes compared to 6 pts underwent emergency VT ablation

• 16 pts had ischemic CM, 5 DCM, 3 ARVD and 1 HCM
Methods

• All pts underwent initial attempt to stabilized from critical status to stable condition in CCU setting prior to the EP and ablation.

• General anesthesia support started as soon as possible after the ER evaluation in all ablation pts

• Inotropic IV therapy to support hemodynamic as needed

• All pt’s were off of antiarrhythmic therapy excluding beta – blocker and lidocaine was discontinued 6 hrs prior to the study

• Standard EP diagnostic catheter placement including CS catheter
Results: Stable VT mapping:
Inferior MI: 73 yrs old male S/P MI and CABG

- Clinical VT Stable to Map
- VT 2
- VT 3
- VT 4 Stable to Map
- Mapping with Orion catheter via trans-septal with deflectable sheath
VT 1: Mid Diastolic to Pre-systolic potentials from critical circuit
VT1: Concealed entrainment pacing from Orion catheter inside critical circuit
HDM VT1 mid diastolic potentials activations
VT 4 Mapping: mid-diastolic potentials and concealed entrainment pacing
HDM VT1 and VT4 critical circuits
Voltage map and ablation sites

Post ablation testing no VT was inducible
Results: Un-mappable VT: 68 yrs old male S/P anterior wall MI/CABG with VT storm prior hx of amiodarone induce pneumonitis LVEF:22%
LV antero-apical MI VT substrate mapping with HDX Grid catheter via trans-aortic approach
RV pacing: LV antero-apical substrate mapping (late potentials)
Antero-apical substrate (low voltage area during RV pacing) mapping with HDX Grip catheter
Antero-apical VT Substrate mapping
Late potentials
LV pacing map (near the critical circuit) to demonstrate reentry

Clinical VT  LV pacing: long stim to capture  LV pacing complex mapping
EGM from Map: Pre and post substrate ablation
83 yrs old female with IsCM in VT storm
LV Endo and Epicardial Map
Endo and EP VT 1 mapping
63 yrs old male with CM in VT storm
Endo and Epicardial RV mapping
Endo and EPI VT mapping
55 yrs old female S/P embolic proximal LAD MI developed recurrent VT/VF and ICD therapies
LV septal mapping

Recording from LV septum during RV pacing
LV septum mapping

LV apical false scar due to the poor contact mapping

LV apical false scar map was corrected with additional 2K mapping point to the area
Bi-Ventricle septal mapping and ablation
Results

• Median of 2.6 VTs were induced
• Total number of VTs induced were 73 and mappable VTs were 31
• Acute success with elimination of all VT: 21/25.
• Elimination of clinical VT in 23/25 pts (1: HCM and 1 Ischemic CM)
• 1 death occurred in pt who failed clinical VT ablation due to the refractory CHF 16 days post LVAD implant
• Median follow-up was 14 months from 23 pts data: 3 pts had ICD shocks, 2 pts with recurrences of fast VT (CL > 290 ms) and one was due to the atrial fibrillation with RVR.
Summaries

• High number of pts with VT storm had clinically important co-existing medical conduction that had direct impact on pt’s critical status at presentation and outcomes.

• High number of pts with structural heart disease VTs were non-mappable due to the unstable hemodynamic parameter during VT.

• High density mapping guided substrate modification was effective eliminating ischemic VT and good alternative ablation method for non-mappable VTs.

• HDM required long and detailed mapping to create substrate map.

• HDM technologies are still in evolution

• Clinical experiences are still limited but growing rapidly
Thank you for your attention