PO-624-04

ADVANCED TECHNIQUES TO MAXIMIZE TISSUE REACH OF CORONARY VENOUS ETHANOL IN ABLATION-REFRACTORY VENTRICULAR ARRHYTHMIAS

Thomas Flautt DO; Akanibo Da-Wariboko MD; Apoor Patel MD and Miguel Valderrabano MD

Background: Venous ethanol infusion can treat ablation-refractory ventricular arrhythmias (VAs). Ethanol tissue delivery can be compromised by collateral flow and technical challenges cannullating intramural veins in complex anatomicies.

Objective: To develop advanced and multi-balloon approaches to ethanol delivery in complex venous anatomy.

Methods: 14 patients referred for initial ablation (n=4) or after failed ablation (n=10) underwent endocardial (n=14), epicardial (n=1), and coronary venous mapping (n=14). 7 patients had left ventricular summit VAs, and 7 had scar-mediated VAs. Double or triple balloons were used in the coronary veins. Advanced strategies for ethanol delivery include use of secondary balloons to (1) block collateral flow in a target vein (2) block collateral flow into a non-target vein (3) cannulate collaterals to reach a target vein that is not easily accessible via its ostium (4) serve as a distal mechanical block to facilitate more proximal vein cannulation and (5) occlude the coronary sinus to allow ostial delivery of ethanol in a branch vessel.

Results: Successful ethanol infusion was accomplished in the following target veins: LV annular (n=2), septal (n=6), lateral (n=1), middle cardiac (n=1), anterolateral (n=2) and posterolateral (n=3). At median follow up of 130.5 days, no patients experienced recurrences.

Conclusion: Utilization of collaterals between non-target and target veins can facilitate ethanol delivery with the multiple balloon technique. Understanding of CS venous anatomy and advanced approaches to balloon deployment may increase the efficacy of venous ethanol for treatment of VAs.

PO-624-05

MULTI-PROGRAMMABLE COHERENT SINE BURST ELECTROPORATION WAVEFORM FOR ATRIAL AND VENTRICULAR CATHETER ABLATION: A FEASIBILITY STUDY

Micah Lee; Randy Werneth BSME, MSci and Kurt S. Hoffmayer MD, PharmD, FHRS

Background: Traditional pulsed field ablation (PFA) energy is typically delivered via a square wave. Direct current can cause muscle stimulation (MS) and electrolysis. Circuit designs also limit peak voltage, which may impact the ability to achieve transmurality throughout the atrium and ventricle.

Objective: Test the feasibility of using a multi-programmable Coherent Sine burst Electroporation (CSE) waveform to achieve a titratable range of lesion depths that address the variability of tissue thickness within the atrium and ventricle.

Methods: A PFA waveform using a sinusoidal delivery has been developed. The CSE waveform is designed to minimize muscle stimulation and increase peak voltage availability. The CSE waveform allows the user to select target voltage, number of sine waves/pulses, delay between pulses, cycle length (~ pulse + delay), number of cycles in a burst, and proportion of bipolar to unipolar energy delivered. Three (3) anesthetized swine underwent CSE PFA ablation in the left ventricle (LV) using a test catheter and generator capable of varying the parameters listed above. An accelerometer was secured around the diaphragm to measure MS. Lesions were delivered in discrete locations throughout the LV. An oscilloscope was used to confirm peak energy delivery. Animals were sacrificed 4-8d after ablation. Gross pathological exam and histology was performed. Depth
was measured over the length of the entire lesion and the average depth recorded. 

**Results:** Mean number of ablations/animal was 3. MS during bipolar energy delivery was measured at 2.5% above nominal respiratory motion. Table 1 shows the average and range of lesion depths. Gross and histological examples of lesions are shown in Figure 1. No steam pops were observed during the studies. No evidence of thermal damage was noted on gross examination. Table 1. Voltage delivery range and Bipolar:Unipolar ratio effect on lesion depth

**Conclusion:** A sinusoidal waveform is feasible and can be delivered over a range of voltages and bipolar:unipolar energy delivery ratios to alter the lesion depth. Additional work is required to characterize MS during other energy delivery modalities and optimize lesion depth in the atrium and ventricle.

<table>
<thead>
<tr>
<th>Delivered Voltage Range 1.895 - 2.465V</th>
<th>n (number of lesions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar:Unipolar</td>
<td>2:1 Bipolar: Unipolar</td>
</tr>
<tr>
<td>(n = 2)</td>
<td>(n = 1)</td>
</tr>
<tr>
<td><strong>Chronic 4-8 days</strong></td>
<td><strong>Chronic Lesion Depth</strong></td>
</tr>
<tr>
<td>(Average lesion depth)</td>
<td>(Average lesion depth)</td>
</tr>
<tr>
<td>5.36mm</td>
<td>6.14mm</td>
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<tr>
<td>4.65 - 6.07mm</td>
<td>6.14mm</td>
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</tbody>
</table>

**PO-624-07**

**ADVERSE EVENTS OF PENTARAY CATHETER VERSUS HIGH DENSITY GRID CATHETER: A REVIEW OF MAUDE DATABASE**

Vishnu Priya Mallipeddi MD; Aakash Sheth MD; Ayeesha Kattubadi and Paari Dominic MBBS

**Background:** Catheter ablation (CA) technology has evolved quickly leading to innovative multipolar mapping catheters with unique shapes and material. While these catheters have tremendously helped in reducing the procedural time and increasing the mapping resolution, they can potentially lead to increased procedural complications, a facet of practice that has not been compared head to head between the two leading multipolar catheters i.e Biosense Webster Pentaray catheter (PA) and Ensite high density mapping catheter (HD Grid).

**Objective:** To analyze the adverse events (AE) associated with PA catheter and HD Grid catheter that were reported to the Manufacturer and User Facility Device Experience (MAUDE) database.

**Methods:** We conducted a retrospective cross-sectional study of the mapping catheter reports submitted to MAUDE from January 2010 to October 2021. The reports were validated by two independent reviewers and differences were resolved by consensus. Relative odds ratio (ROR) was used to compare the risk of adverse events between the two catheters.

**Results:** We identified 343 AE with PA catheter and 112 AE with HD grid catheter. PA catheter has a disproportionately higher number of reports for physical entanglement with cardiac structures (18%; ROR 4.81), cardiac arrest with return of spontaneous circulation (ROSC) (3%; ROR 3.33) and ST elevations on EKG (2%; ROR 2.31) compared with HD grid catheter. HD grid catheter on the other hand had disproportionately higher reporting for cardiac perforation (29%; ROR 2.33), stroke/transient ischemic attack (13%; ROR 10.45) and death (4%; ROR 2.08).

**Conclusion:** Use of PA catheter was associated with higher number of catheter entanglement with cardiac structures, development of thrombus/tissue on the catheter, cardiac arrest with ROSC and ST elevations on EKG compared with HD grid catheter whereas HD grid catheter was associated with higher number of cardiac perforation, stroke and death.