PO-632-08
REDUCTION OF SUBCUTANEOUS DEFIBRILLATION THRESHOLDS WITH A DUAL-COIL ELECTRODE SYSTEM IN SWINE
Stephen Hahn PhD; Megan Fine DVM; Michelle Curtis; Andres Belalcazar PhD and Wyatt K. Stahl BS, BSE, BSEE, CCDS

Background: S-ICD systems deliver 80 J shocks from a left-para sternal coil to a left lateral PG. A system that defibrillates with lower energy could enable a significant reduction in PG size. Computer models of shock fields in human torsos suggest dual parallel coils lower shock impedance and may reduce DFTs by ~50%.

Objective: Compare defibrillation efficacy of single (S) and dual (D) coil shock configurations in isoflurane-anesthetized swine.

Methods: Two 8 cm long coil electrodes were inserted subcutaneously (SQ) and/or intermuscularly (IM), ~1 cm apart, along the sternal margin. The PG was placed IM in a left postero-lateral pocket caudal to the scapula. DFTs of S and D were randomly determined using an up-down process with 10% voltage steps. VF was induced and continued for 10 s prior to test shock. Testing continued until at least three reversals in outcome occurred. DFT was computed by averaging the tested values. Results were compared via t-tests.

Results: Shock impedance was lower than in humans and IM vs SQ coil placement significantly affected results, likely due to layers of sternal muscle that are not present in humans. Impedance was always lower with D vs S, but SQ had higher to layers of sternal muscle that are not present in humans. vs SQ coil placement significantly affected results, likely due to computer models of human torsos. Use of dual coils to reduce DFT appears promising, but swine may not be a good model for S-ICD. This requires study in humans.

Conclusion: Parasternal electrode configurations that reduced shock impedance (intramuscular placement or dual coils) also reduced DFT in swine, but to a lesser extent than predicted by computer models of human torsos. Use of dual coils to reduce DFT appears promising, but swine may not be a good model for S-ICD. This requires study in humans.

<table>
<thead>
<tr>
<th></th>
<th>Single-Coil SQ</th>
<th>Dual-Coil SQ</th>
<th>Single-Coil IM</th>
<th>Dual-Coil IM</th>
</tr>
</thead>
<tbody>
<tr>
<td>N tested</td>
<td>6</td>
<td>6</td>
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<tr>
<td>Impedance (Ω)</td>
<td>48.6 ± 9.6</td>
<td>39.3 ± 6.4</td>
<td>34.4 ± 2.4</td>
<td>29.7 ± 2.4</td>
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<tr>
<td>Energy (J)</td>
<td>73.1 ± 29.2</td>
<td>61.7 ± 27.6</td>
<td>44.3 ± 16.3</td>
<td>39.5 ± 18.3</td>
</tr>
</tbody>
</table>

* indicates p<.05 vs single, † vs SQ

POSTER PO-633:
Posters: CIED at Pod 5

Friday, April 29, 2022
3:00 PM - 5:00 PM

PO-633-01
THE EFFECT OF DEFIBRILLATOR ON MORTALITY IN NON-ISCHEMIC CARDIOMYOPATHY WITH RESYNCHRONIZATION THERAPY
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Background: Recent studies have questioned the role of defibrillators in non-ischemic cardiomyopathy (NICM). This meta-analysis assessed the long-term outcomes of cardiac resynchronization therapy (CRT) with or without defibrillation in patients with NICM.

Objective: To evaluate effect of defibrillator on mortality in non-ischemic cardiomyopathy with resynchronization therapy

Methods: Databases were searched for studies reporting the effect of CRT with or without defibrillation on all-cause mortality in patients with NICM (Ovid MEDLINE, EMBASE, Scopus, Web of Science, Google Scholar, and EBSCO CINAHL). The primary endpoint was all-cause mortality. The minimum duration of follow-up required for inclusion was one year. The search was not restricted to time or publication status.

Results: The literature search identified 955 candidate studies, of which 15 studies and 22,763 patients were included. Mean follow up was 53 months (17-100 months). CRT-D in NICM was associated with lower all-cause mortality (log HR -0.169, SE 0.055; p=0.002) compared to CRT-P. Heterogeneity: df=15 (P=0.03), I2 =43. Test for overall effect: Z = -3.043 (P = 0.002).

(Figure 1)

Conclusion: CRT-D in NICM was associated with lower all-cause mortality compared to CRT-P.

Figure 1: Forest plot showing the effect of CRT-D vs CRT-P in patients with non-ischaemic cardiomyopathy that was associated with lower all-cause mortality (log HR -0.169, SE 0.055; p=0.002) compared to CRT-P. Heterogeneity: df=15 (P<0.001), I2 = 43. Test for overall effect: Z = -3.043 (P=0.002).

PO-633-02
THE IMPACT OF INCISION TECHNIQUE ON INAPPROPRIATE SHOCK RATES IN THE UNTOUCHED STUDY
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Background: Subcutaneous implantable cardioverter defibrillators (S-ICDs) implant practice has evolved from the 3-incision (3IT) to the 2-incision technique (2IT). In the UNTOUCHED trial the 2IT was found to reduce implant time by almost 15% but be an independent predictor of inappropriate shocks (IAS). The 2IT relies on tunneling the S-ICD lead vertically from the supra-Xiphoid incision, thus the superior electrode is not secured to the underlying muscle or fascia. Whether the association between the 2IT and IAS is related to the technique itself or confounding variables is unclear.

Objective: To investigate the association between 2IT and IAS in the UNTOUCHED trial.

Methods: Primary prevention patients (pts) with ejection fraction ≤35% and no pacing indication were prospectively
enrolled and implanted with S-ICDs and followed for up to 18 months in the UNTOUCHED trial (n=1111). IAS rates by implant technique and by sense vector were evaluated and Multivariable modeling was used allowing for interaction terms with incision technique.

**Results:** Pts implanted using 2IT were more likely to be male (p=.0131) and have lower BMI (p=.0016). Overall IAS rates for pts implanted using 2IT were 4.7% vs 2.6% using 3IT. Pts implanted using 2IT were three times as likely to receive IAS due to non-cardiac oversensing (myopotentials, noise, etc; 1.8% vs 0.6%) and more than twice as likely to receive IAS due to t-wave over-sensing (2.0% vs 0.9%). In pts implanted using the 2IT, IAS rate was similar when the sense vector included the distal electrode as compared to patients programmed with the primary vector (distal electrode excluded): 19 pts (2.4%) experiencing 29 episodes vs. 20 pts (2.6%) experiencing 27 episodes respectively (p=1.0). Multivariable modeling results (table) showed the only significant interaction term with 2IT was BMI, leading to less risk of IAS. In contrast, 2IT remained a significant, independent predictor of increased IAS and BMI was also an independent predictor of increased IAS.

**Conclusion:** In the UNTOUCHED trial, the two-incision technique was found to be an independent predictor of inappropriate shocks. This increase does not appear to be a consequence of an unsecured tip electrode. More analysis is needed to further understand the interaction between the 2IT and BMI on inappropriate shocks.

**Methods:** A 7Fr conductance catheter (CD Leycom, the Netherlands) was inserted into the RV to record PV loops during speed optimization study in a 78 year old woman with non-ischemic cardiomyopathy post CRT, pacemaker dependent atrial fibrillation, and Heartmate 3 LVAD. Concurrently, pulmonary arterial catheter (PAC) measured intracardiac pressure. Pacing strategies were assessed at low (4800 rpm) and high speed (5400 rpm). RV function was assessed by slope and contour of end-systolic PV relationship (ESPVR) and end-diastolic PV relationship (EDPVR).

**Results:** At low speed there was no significant change in RV systolic or diastolic function among pacing strategies. At high speed, peak pressure generation declined and ESPVR slope was shallower with LV-only pacing. There was no significant difference in RV function between BiV and RV-only pacing. PAC measured pressure and cardiac output were unchanged with pacing at both speeds.

**Conclusion:** RV PV analysis identified hemodynamic changes associated with different pacing strategies not evident with traditional assessment of filling pressures. LV-only pacing negatively impacted RV function while RV-only and BiV pacing had similar RV hemodynamics. Further investigation is needed to evaluate this pattern in additional LVAD patients.

**PO-633-04**

**WHAT’S ALL THAT NOISE? A CASE OF DEVICE TO DEVICE INTERFERENCE DURING SECOND MICRA AV IMPLANT NECESSITATING AD HOC OLDER DEVICE EXTRACTION**

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**Background:** Implantation of leadless pacemaker devices is becoming more prevalent in patients with relative contraindications to traditional systems. To date, little has been described about the complications that arise when patients require implant of subsequent additional leadless devices.

**Objective:** To describe device-device interference as a significant limitation to multiple leadless pacemaker implantations.

**Methods:** N/A

**Results:** A 62 year old veteran with ESRD on HD via right IJ tunneled catheter, Type 2 DM, mixed cardiomyopathy (LVEF 40-45%) from severe aortic stenosis presented with symptomatic complete heart block with a ventricular escape in the setting of hyperkalemia from a missed dialysis session. He continued to require temporary pacing despite correction of his electrolyte derangements with HD. Due to poor transvenous options, he underwent successful implantation of a leadless pacemaker (Micra AV). He had good sensing (20 mV) and pacing parameters on post op day 1 (0.83v at 0.24ms, 830 ohms). Unfortunately, the patient represented with symptomatic complete heart block 43