Objective: Report first-in-man intracardiac electrogram of commotio cordis in a person with an implantable cardioverter-defibrillator.

Methods: N/A

Results: A 67-year-old man with nonischemic cardiomyopathy, recovered ejection fraction after biventricular defibrillator implantation, and no history of ventricular arrhythmias was struck by a vehicle while crossing the road and sustained bilateral rib, right femur, and bilateral malleolar fractures. He recalled being struck by the vehicle and felt he may have lost consciousness after impact. Device interrogation showed artifact due to trauma followed by premature ventricular contractions (orange asterisks) and development of ventricular fibrillation (orange bar) status post successful defibrillator shock (arrow) at time of the accident. His troponin level was normal, and cardiac catheterization showed nonobstructive coronary artery disease. On further review of the intracardiac electrogram, ventricular fibrillation was preceded by normal biventricular pacing (first three blue asterisks), 3 seconds of artifact in the far-field channel indicative of trauma-induced dispersion of repolarization of the left ventricle (purple bar) likely corresponding with vehicular impact. The combination of a long-short sequence of a biventricular paced beat (fourth blue asterisk) and premature ventricular contraction (second orange asterisk) and spatial heterogeneity of repolarization initiated ventricular fibrillation.

Conclusion: This is a unique example of commotio cordis in a patient undergoing biventricular pacing who sustained vehicular trauma resulting in ventricular fibrillation captured by intracardiac electrogram and treated successfully by a device shock. This case provides a human correlate to experimental models of commotio cordis by demonstrating the critical timing of premature ventricular contractions in the induction of ventricular fibrillation.

PO-621-02

EXTRACTION OF LEADS ACROSS THE TRICUSPID VALVE DOES NOT SIGNIFICANTLY ALTER TRICUSPID VALVE REGURGITATION

Colby Shanafelt MD; Thomas G. Middour MD; Mikhail F. El-Chami MD, FHRS; Soroosh Kiani MD, MS; Michael S. Lloyd MD, FHRS; Faisal M. Merchant MD, FHRS; Anand D. Shah MD; Stacy B. Westerman MD, MPH and Neal Kumar Bhatia MD

Background: Pacemaker and defibrillator leads have been implicated in tricuspid valve (TV) dysfunction, but limited data are available regarding the effect of extracting leads across the tricuspid valve on valve function. While there is growing interest in TV intervention, including lead-related dysfunction, the effect of extraction across the valve is not well studied.

Objective: This study analyzed the effect of cardiac lead extraction across the tricuspid valve on tricuspid regurgitation (TR) severity.

Methods: We performed a single center retrospective analysis of consecutive patients referred for extraction from October 2019 to October 2021. TR was graded on a scale of 0 to 3 (0 = none/trivial, 1 = mild, 2 = moderate, 3 = severe) on echocardiogram before and after transvenous lead extraction performed across the TV. Patients were included if they underwent echocardiogram before and after lead extraction (N=90).

Results: A total of 90 patients (34%, 266 total extractions) underwent an echocardiogram before and after lead extraction of 100 leads across the TV (1.12 +/- 0.73 leads across the TV per patient). Indications for extraction included infection (52), lead dysfunction (18), and TR (5). Extraction tools were used in 60 procedures (31 mechanical, 24 laser, 5 both mechanical and laser). Pre-extraction average TR grade was 1.37 +/- 0.93 and post-extraction average TR grade was 1.37 +/- 1.06 (p=1.0). Changes in TR are presented in Figure 1. Nineteen patients had worsening of TR, of whom one had worsening by more than one grade. Although the use of extraction tools was associated with a numerically higher rate of worsening TR, the difference was not significant (25.0% vs. 13.3%, p=0.20). Nineteen patients had improvement of TR, of whom one improved by more than one grade.

Conclusion: In our single center analysis, extraction of leads across the TV did not significantly affect the extent of TR. Although only a subset of patients had paired echocardiograms before and after extraction, patients with clinical concern for worsened TR following extraction were more likely to have echocardiograms performed.
PO-621-03

DUAL-CHAMBER LEADLESS PACEMAKER ENABLES ROBUST ATRIOVENTRICULAR SYNCHRONY IN VARIOUS POSTURES AND PACING CONFIGURATIONS

Reinoud Knops MD, PhD; Daniel J. Cantillon MD, FHRS; Petr Neuzil MD; Rajesh S. Banker; Mayer Rashian MD, FHRS, CCDS; Rahul N. Doshi MD, FHRS; Daniel Booth MEng; Weiqun Yang MS, MSBME; Aditya Goli; Nima Badie PhD; David Ligon BSME, MSBME and Matthew G. Fisher PhD

Background: Dual-chamber leadless (DDD) indicated patients require atrioventricular (AV) synchronous pacing involving beat-by-beat, wireless communication between devices. Implant-to-implant (i2i™) communication enables true AV synchrony. At each paced or sensed event, one leadless pacemaker (LP) communicates wirelessly with the other. Changes in posture could affect orientation of the LPs and thereby potentially impact i2i communication.

Objective: Demonstrate the performance of a novel, beat-by-beat i2i communication modality for synchronous, dual-chamber pacing using 2 implanted LPs in the right atrium (RA) and right ventricle (RV) while subjects assume various postures.

Methods: A preclinical feasibility study was performed with ovine, and AV synchrony was evaluated in various postures and pacing configurations. RA and RV AtrialView™ DR LPs (Abbott, Abbott Park, IL) were implanted in 7 subjects: 4 with AV block and 3 without AV block. Inclusion of AV block subjects allowed for normal paced and sensed AV delays when delivering ventricular pacing (VP). After at least 1 month post-implant, each subject received pacing in 2 configurations: either AP (atrial pace)-VP and AS (atrial sense)-VP or AP-VP (ventricular sense) and AS-VS. Diagnostic data was analyzed following 5-min periods of on-demand testing for which each ovine assumed a series of postures (left and right laterals, supine, and standing). i2i communication success rate was used as a surrogate metric to approximate AV synchrony.

Results: The overall i2i communication success rate was 98.6 ± 1.6%. The i2i success rates by posture were equivalent (P=0.19): 98.9 ± 1.7% (left lateral), 99.9 ± 0.0% (right lateral), 98.1 ± 4.2% (supine), and 97.3 ± 4.2% (standing). Heart rate was on average 98 ± 21bpm (range: 30-170). The i2i success rates by pacing configuration were equivalent (P=0.76): 98.4 ± 3.4% (AP-VP), 98.8 ± 1.6% (AP-VS), 99.4 ± 0.7% (AS-VP), and 97.9 ± 2.7% (AS-VS). Of all instances when i2i communication was lost, 99.4% were shorter than 6 sec—yet ventricular pacing was always maintained, if needed, at the current rate. Postural changes and pacing configurations did not significantly impact i2i success rates.

Conclusion: True dual-chamber (DDD) leadless pacing is feasible whereby AV synchronous i2i communication is maintained beat-by-beat.