Background: The need for pacemaker is a common complication after TAVR. We previously described a risk score (Emory Risk Score, ERS) to predict the need for new pacemaker implant (PMI) after TAVR. Metrics included in the score are a history of syncope (1 point), pre-existing right bundle branch block (2 points), QRS duration $\geq 140$ ms (1 point), and prosthesis oversizing $\geq 16\%$ (1 point).

Objective: To prospectively validate the ERS among a separate cohort of patients undergoing TAVR.

Methods: We prospectively evaluated all patients without preexisting pacemakers or ICDs, nor pre-existing indications for pacing, and with available imaging data undergoing a first-time TAVR with a balloon-expandable TAVR prosthesis at our institution from March 2019 to December 2020 (n = 556). Patients were scored prospectively, however results were blinded from clinical decision making. The primary endpoint was PMI for high grade AV block within 30 days after TAVR. Performance of the ERS was evaluated using logistic regression, a calibration curve to prior performance, and receiver operating characteristic (ROC) analysis.

Results: The overall STS risk in the prospective cohort was lower than the original development cohort (3.4 $\pm$ 2.7 vs. 6.0 $\pm$ 4.2, p < 0.001). A total of 41 patients (7.4\%) had PMI after TAVR. A higher ERS predicted an increased likelihood of PMI (Figure 1, OR 2.73 per point increase in score; 95\% CI 2.08 - 3.56, p < 0.0001). There were relatively few patients in the ERS 4+ category, which may explain the apparent plateau in risk. There was good correlation between observed and expected values on the calibration curve (Figure 2). The area under the ROC curve was 0.804 (95\%CI 0.725-0.883, p < 0.0001) demonstrating very good discrimination for new pacemaker placement post TAVR.

Conclusion: The ERS prospectively predicted PMI for an indication of high grade AV block in a serial, real-world cohort of patients undergoing TAVR with a balloon-expandable prosthesis, confirming findings previously described in retrospective cohorts. Notably, despite being tested in a lower risk population, the prospective performance of the ERS was comparable to that in the cohort in which the score was developed. The ERS can serve as a clinical framework for pre-procedural risk stratification for the need for pacemaker after TAVR.

PO-620-07

AN ENSEMBLE OF FEATURES BASED DEEP LEARNING NEURAL NETWORK FOR REDUCTION OF INAPPROPRIATE ATRIAL FIBRILLATION DETECTION IN IMPLANTABLE CARDIAC MONITORS

Shantanu Sarkar PhD

Background: Multiple studies have been reported for electrocardiogram (ECG) classification using deep learning neural networks. Most of these studies use the ECG as input to a convolution neural network (CNN) which then automatically generate features from the raw ECG signal.

Objective: To develop an application specific deep learning CNNs using custom ensemble of features to reduce inappropriate AF detections in implantable cardiac monitors (ICM).

Methods: The ensemble of features was developed and combined to form an input signal for deep learning CNN. The ensemble of features were designed based on the electro-physiological characteristics during AF: presence of fibrillation/flutter waves or absence of single p-wave between two R-waves, incoherence of RR intervals, and AF begetting more AF. A small custom CNN model using 6 convolution layers and the publicly available RESNET18 model were used. The deep learning models were trained and validated using more than 60K ICM detected AF episodes that were adjudicated to be true AF or false detections. The trained models were evaluated using an independent test dataset of ICM detected and adjudicated AF episodes from patients who were not included in the training and validation dataset.

Results: The training and validation dataset consisted of 31,768 true AF episodes (2516 patients) and 28,527 false episodes (2126 patients). The validation set used 20\% of randomly chosen episodes of each type. The independent test set consisted of 4546 true AF episodes (418 patients) and 5384 false episodes (605 patients). In the validation set, the custom CNN had an area under ROC curve (AUC) of 0.996 (0.993 for RESNET18) and a threshold for discrimination was defined such that a relative sensitivity and specificity of 99.2\% and 92.8\% (99.2\% and 87.9\% for RESNET18) was obtained. The performance results for the two models in the independent test dataset for the pre-defined threshold is shown in the figure, with relative sensitivity and specificity of around 99\% and 90\% respectively.
Conclusion: An ensemble of features based deep learning CNN was developed that reduced inappropriate AF detection in ICM by over 90% while preserving sensitivity for detection of true AF. For an application specific feature based CNN, a smaller sized custom CNN performed as well as a larger sized established CNN.

PO-620-08

SYSTEMATIC REVIEW AND META ANALYSIS OF CURRENTLY AVAILABLE LEFT ATRIAL APPENDAGE CLOSURE DEVICES

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Background: Recent advancements in management of atrial fibrillation and high risk bleeding patients with devices, are calling for a direct comparison of the left atrial appendage closure (LAAC) devices. This meta analysis compares the available LAAC devices and their success rate in relation to peri device leak at 45 day follow up.

Objective: Atrial fibrillation is the most frequent cardiac arrhythmia affecting 15 - 20% of all ischemic strokes. Oral antiocoagulation is used to decrease the risk of stroke but in patients with bleeding and CI of antiocoagulation, LAAC is proven to be equally effective as >90% of the thrombi are formed in the left atrial appendage. Most commonly used LAAC devices are Watchman 2.5, Amulet and Watchman FLX. Our aim for this study is primarily focused on peridevice leak rate at 45 day follow up with either TEE or CCTA for each device by pooling data from the available studies till date.

Methods: We searched PubMed, AHA, JACC and Science Direct and article references for randomized controlled trials of patients with LAAC devices and rate of leaks at 45 day follow ups. Clear inclusion and exclusion criteria were established. We identified ten studies eligible for inclusion. We carried out a meta-analysis of the relative odds on the basis of a random-effects model using the Mantel-Haenszel method for the major outcomes of bradycardia. Comprehensive Meta-Analysis Version 3 software was used for analysis.

Results: First Watchman 2.5 VS Watchman FLX data was compared, which favored Watchman FLX. Total 1027 watchman 2.5 and 688 Watchman FLX devices were compared. Next, Amulet vs Watchman 2.5 comparison favored Amulet with total number of devices 1091 and 1027 respectively. Next, Amulet vs Watchman FLX was compared which favored Amulet with total no. of devices 1093 and 688 respectively.

Conclusion: Though, more sample size and RCTs are required to make any strong conclusions, our study has shown Amulet is associated with fewer number of leaks compared to all the available devices at 45 day follow up.

POSTER PO-621:
Featured Posters: CIED, Heart Failure, Provocative Cases at Pod 8

Friday, April 29, 2022
12:30 PM - 2:30 PM

PO-621-01

INTRACARDIAC ELECTROGRAM OF COMMOTIO CORDIS

Peter Hanna MD, PhD and Duc Do MD

Background: Experimental models have identified timing of the trauma-induced premature ventricular contraction with respect to the cardiac cycle as critical to the development of ventricular fibrillation in commotio cordis.