predicted optimal lead location were compared to clinical responder markers.
Results: The best classifier using a complete set of clinical and simulation data showed an average accuracy = 0.78, ROC AUC = 0.78, sensitivity = 0.75, specificity = 0.8, that were much higher than in the model built on the clinical data only. Seven out of ten clinical non-responders were classified as responders based on model simulations with predicted optimal lead location.
Conclusion: Our pilot results show that combination of clinical and simulation data significantly increases the accuracy of classification models for CRT outcome. Our results suggest that model predictions on the optimal ventricular lead location may essentially increase the probability of CRT success.

B-PO05-010

REMOVING THE VENTRICULAR FAR FIELD FROM UNIPOLAR ATRIAL ELECTROGRAMS IN A CLINICALLY FEASIBLE SETUP WITH A PHYSICALLY MOTIVATED MODEL YIELDS HIGH QUALITY RESULTS

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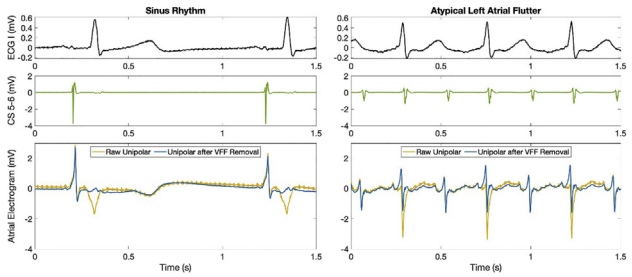
Background: While bipolar electrograms have dominated electrophysiological studies of the atria in the past, unipolar electrograms come with advantages in undistorted morphology but pose undesirable interference with the ventricular far field (VFF). Blanking or template building are common approaches to alleviate this drawback but tremendously reduce data or prolong the procedure. None of the approaches is clinically satisfactory.
Objective: This study quantitatively evaluates the clinical performance of a VFF removal technique which builds a spatio-temporal model of the VFF in the atria to be applied to any location without prolonging the procedure.
Methods: The study comprised fourteen subjects with recordings both in sinus/paced rhythm and an atrial arrhythmia. The ventricular activation was modeled in space and time by electrical dipoles placed below the atria. Dipoles were parameterized to fit the VFF recorded in the atria with the Orion™ catheter during sinus/paced rhythm. The electrical potential emerging from the dipoles was propagated to the atria and subtracted from the unipolar electrograms. The residual VFF was quantified for datasets in sinus/paced rhythm and assessed for recordings during atrial flutter.
Results: The median residual VFF amplitude amongst all patients was reduced from 1.64mV to 0.27mV. The median peak-to-peak amplitude of all unipolar atrial activations considered for mapping measured 2.71mV. More than 90% of the residual VFFs fell below the atrial activations of interest.
Conclusion: With the residual VFF dropping below the atrial signal of interest, the dipole method provides unipolar electrograms of high quality for clinical application.



B-PO05-011

DIRECTED GRAPH INFORMATION FLOW MAPPING FOR CHARACTERIZING CARDIAC ELECTRICAL PROPAGATION FROM UNANNOTATED UNIPOLAR ELECTROGRAMS

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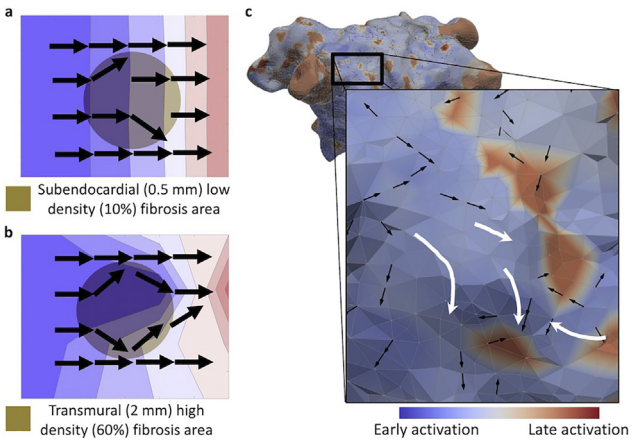
Background: Understanding the electrical propagation during atrial fibrillation (AF) is crucial for an optimal ablation strategy. Technologies like Coherent mapping and STAR mapping estimate the electrical propagation relying on the annotation of local activation time (LAT) of electrograms, which is hard to determine in complex signals. Transfer entropy (TE) measures the amount of information flow between two processes, allows the study of the propagation's spatio-temporal dynamics without electrogram annotation.
Objective: To represent the wavefront propagation in cardiac tissue preserving spatio-temporal information of AF without LAT annotation on unipolar electrograms (uEGM).
Methods: Tissue patches were simulated for 6 seconds, varying the random distribution of fibrosis density (10% - 60%) and transmurality (0.5 mm - 2 mm). uEGMs were collected at the tissue surface. As a proof of concept, the method was applied to clinical data from one AF patient mapped with a 20-pole Lasso catheter. TE was calculated for each pair of uEGM, and a directed graph (DG) was created to obtain the propagation direction.
Results: DG-TE black arrows show local conduction blocks not captured by LATs (panela and b). DG-TE maps revealed local conduction blocks corresponding with late activated areas in the AF patient and global direction (white arrows) of the electrical propagation, while LAT annotation was unclear (panel c).
Conclusion: DG-TE is a promising method to characterize cardiac tissue information flow from unannotated uEGMs to support ablation therapy. DG-TE mapping offers the possibility to locate blocks of conduction during AF.



B-PO05-012

PREDICTING ATRIAL FIBRILLATION RECURRENCE BY COMBINING POPULATION DATA & PATIENT-SPECIFIC MODELING

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