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Electromechanical Cycle Length Mapping: A Novel Technique For 3D Atrial Arrhythmia Characterization And Cardioversion Success Assessment

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Abstract:

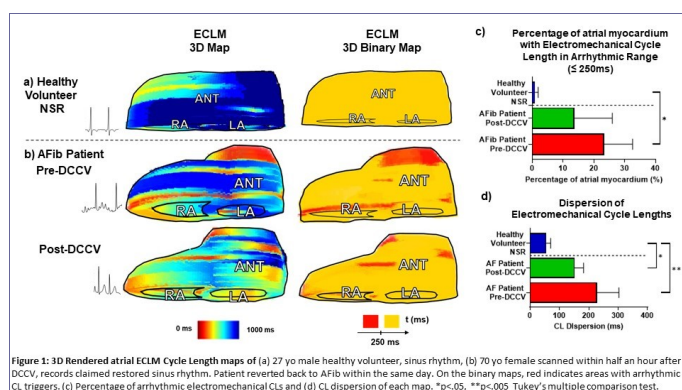
Background: Electromechanical Cycle Length Mapping (ECLM) is a high frame rate, ultrasound-based frequency analysis technique, shown to non-invasively map atrial electromechanical activation in paced canines and re-entrant flutter (AF) patients.

Objective: More accurate arrhythmia localization and extent estimation, in conjunction with 12-lead EKG, can help critical decision making. This study assesses ECLM feasibility to map arrhythmic activation rates, monitor cardioversion (DCCV) recovery and potentially inform procedure failure in humans.

Methods: Twenty-three subjects (57.3 ± 21.2 yo; 65% male; 6 AF; 10 AFib; 7 healthy NSR) underwent transthoracic ECLM in four standard apical echocardiographic views. AFib patients were imaged before and after DCCV. 3D atrial ECLM cycle length (CL) maps were rendered and CL dispersion and percentage of arrhythmic CLs ($CL \leq 250$ ms) were calculated for each subject. Post-DCCV ECLM results were subsequently used as indicators of success.

Results: ECLM successfully identified activation rates in 100% of AF and NSR cases. In AFib, ECLM localized irregular activation rates pre-DCCV, which were eliminated post successful DCCV. Inadequate reduction of arrhythmic CLs and CL dispersion post-DCCV to NSR control levels indicated insufficient SR recovery and AFib recurrence, later confirmed clinically upon follow-up (Fig. 1).

Conclusion: ECLM can non-invasively map the electromechanical activation cycle lengths in NSR, AF, AFib pre and post DCCV, quantify their extent as well as help identify unsuccessful DCCV immediately post-procedure. ECLM could thus serve as a helpful tool for treatment assessment and monitoring of clinical cardioversion.



Author Disclosure Information:

M. Tourni: Nothing relevant to disclose.

Category (Complete): 33) Mapping & Imaging

Keywords (Complete): C -> Cardioversion ; E -> Echocardiography, transthoracic

Additional Information (Complete):

Presentation Preference: Oral or Poster

At the conclusion of this presentation, attendees will be able to: (Maximum character limit 250)

***Learning Objective:** : Understand how Electromechanical Cycle Length Mapping can benefit atrial arrhythmia localization, extent estimation and post-procedure cardioversion success assessment.

Abstract Awards (Complete):

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