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Imaging

A NEW METHOD USING CARDIAC CT KINEMATICS TO REFLECT THE ACTIVATION PATTERN VISUALIZED WITH ELECTROANATOMICAL MAP: CARDIAC CT PHASE TIME VELOCITY ACTIVATION-ENCODED MAP (ACTIVATE)

Poster Contributions
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Background: Electromechanical coupling is a process that links electrical cardiac excitation to mechanical contraction of the myocardium. We aim to develop a novel CT velocity-based software that maps contractility to reflect the activation pattern seen on electroanatomical map (EAM).

Methods: We performed EAM and gated contrast-enhanced CT in 7 healthy pigs and used 2 pigs for software development. CT datasets were reconstructed at 5% increment of the R-R interval (20 phases) and interpolated 3x using a non-rigid registration (60 phases). By aligning cardiac structures with individual voxel tracking through the cardiac cycle, CT velocity was derived. Cardiac CT Phase Time Velocity-encoded Activation Map (ACTIVATE) displays time to peak systolic velocity in a binary color template. Left ventricular (LV) myocardial velocity was tracked throughout systole and both 20 and 60 phase datasets were compared against EAM.

Results: The interpolated 60-phase CT dataset was qualitatively better reflective of the activation pattern seen on EAM as compared to the 20-phase dataset by visual assessment. The red color in Figure A and B (antero-posterior [AP] and postero-anterior [PA] projections) depict the EAM activation pattern and corresponding CT kinematic map.

Conclusions: We present a new CT method that noninvasively reflects myocardial activation pattern with potential to identify the site of latest activation to guide LV lead placement for device therapy. Validation will be performed in the remainder pigs.